AMERICAN DYESTUFF REPORTER

Including the Proceedings of the
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME XIII — MARCH 10, 1924 — NUMBER 5

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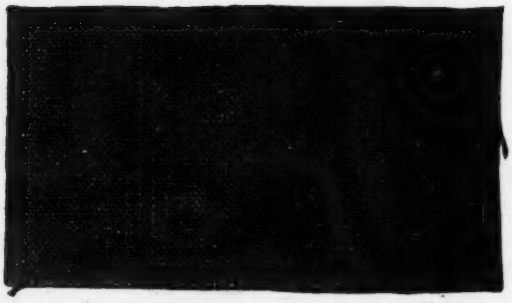

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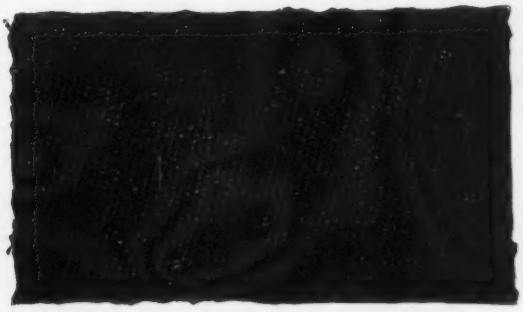

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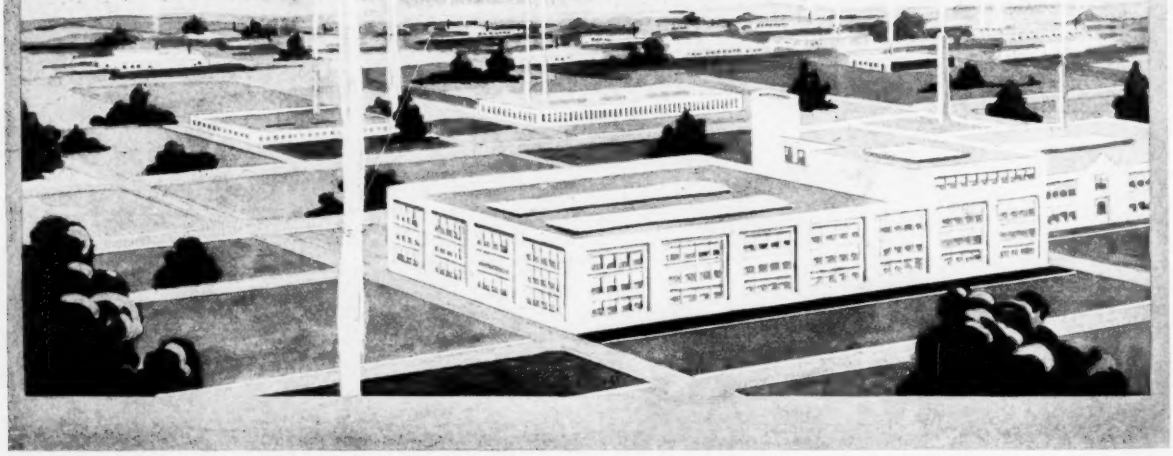

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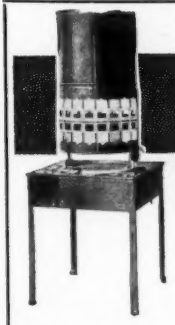

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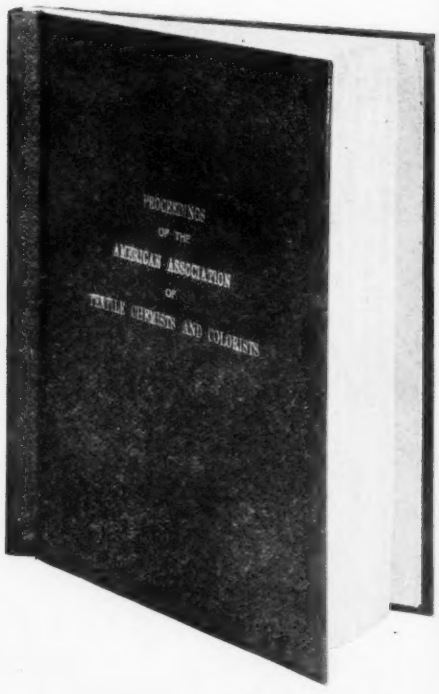

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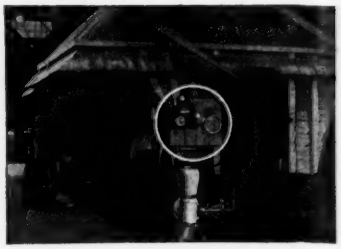

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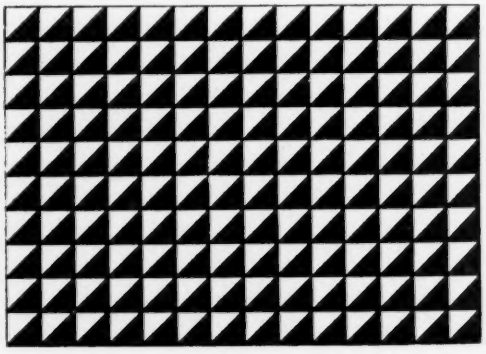

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VOLUME XIII NEW YORK, MARCH 10, 1924 NUMBER 4

The Coloring of Paper

Kinds of Fiber—Coal-Tar Dyes—Basic Dyes—Acid Dyes—Direct Dyes—Equipment of the Color Room —Determining the Proper Dye—The Two-Sided Effect—Pigments

By NORMAN CLARK

A. M. Collins Manufacturing Company, Philadelphia, Pa.

NEARLY every paper is colored. Even to obtain our pure white sheets of writing paper would be impossible were it not that the natural yellowness of the fibers is neutralized by the introduction of red and blue in their manufacture.

But the coloring of paper for the sake of the color is becoming an increasingly important process. It serves a double purpose. It not only adds to the attractiveness of the paper, but it frequently plays its part in an elaborate and carefully worked out color scheme in the mind of the ultimate consumer—a scheme designed to make the message which he has to convey clearer and more effective. For this reason, mere color is not enough and the gradations of shade and tone take on an importance that they did not formerly possess.

Some paper, such as writing and wrapping, is colored during its manufacture, while others receive their color during conversion, as in the case of box and wall papers. Let us first consider coloring as part of the manufacturing process.

Since paper is a web of interlaced cellulose fibers, its reaction to dyestuffs may be considered as that of the individual fibers which make up the paper. Thus, in the case of cotton or linen fibers our study of the action of cotton and linen fiber toward dyestuffs gives us the information regarding the properties of the sheet.

Kinds of Fiber

Paper may consist of various kinds of fibers, each possessing different characteristics. They include the following:

1. Mechanical Wood.—Wood reduced to individual fibers by mechanical disintegration.
2. Sulphite Pulp.—Fibers prepared by treating wood with sodium or calcium bisulphite.
3. Soda Pulp.—Fibers prepared by treating wood with soda lye.
4. Sulphate Pulp.—Fibers prepared by treating wood with sodium sulphide.
5. Rag Pulp.—Waste from cotton or linen fabrics.
6. Special pulps from jute, hemp, esparto or other grasses.

Paper, depending on the purpose for which it is manufactured, may be made from any one kind of pulp, or it may be a mixture of two or more pulps.

Paper may be colored by the use of one or more of three mediums, namely: (1) Coal-tar dyes; (2) pigments—natural and chemical; (3) natural organic colors. By far the largest in use are coal-tar dyes.

Coal-Tar Dyes

Passing directly to the use of coal-tar dyes, we find those in most common use to be those of the basic, acid or direct classes. In some cases sulphur and vat dyes are used.

Regardless of the class to which they belong, all coal-tar dyes for use in dyeing paper should be dissolved in boiling or nearly boiling water, and strained through a fine mesh strainer before being added to the beater. Exception should be made in the case of Auramine and Chrysoidine, which should not be dissolved in water over 160 deg. Fahr.

As a general rule, about 10 gallons of water should be used per pound of dyestuff. Acid dyes, due to their great solubility, may be dissolved in less water. With paper, as in many other products, it is better to add each dyestuff to the beater separately, even though they are of the same class. On no account mix basic and acid dyes or basic and direct dyes, as they will precipitate each other, causing partial or total loss of color value.

Each dyestuff solution should be prepared fresh just

before using, as many dyes are impaired in color value on standing in solutions for a prolonged period. Exception to this may be taken in the case of tinting white paper. In this case such small amounts of dyestuffs are used that a standard solution should be made up and an aliquot portion taken as required. This solution, however, should be made up at frequent intervals.

Basic Dyes

Let us now consider the dyes as classes, beginning with the basic dyes. These are the dyes used most extensively in the coloring of paper stock. They are characterized by great tinctorial strength but inferior light fastness and sensitiveness to alkali in most cases.

As we would judge from the behavior of the fibers, basic dyes are best suited for all kinds of unbleached fibers. In the case of mixed stocks, however, there is considerable tendency to mottle. This can often be overcome by adding the dyestuff to the beater before the stock, thus insuring its being very dilute. This tendency to mottle can also be largely overcome by topping with well-selected level-dyeing acid colors, adding these first. It is immaterial whether the rosin size is added before or after the basic dye, but at least part of the alum solution should be added before the dye.

On bleached stocks where ordinarily the absorption is not very good, the dyeing may be improved by the addition of 2 per cent of soda ash (based on the amount of stock in the beater). The soda ash is added at the same time as the rosin size and an increase of alum must be made to compensate for the increased alkalinity. The soda ash may produce a slightly different shade, and this must be taken into account.

In the dissolving of basic dyes it is the best practice, especially where the water is somewhat hard, to make a paste of the dyestuff and acetic acid before adding the hot water. In this connection remember that in making a solution of Methyl Violet, cold water should on no account be added, as the dye will go into a hard tarry mass which will be almost impossible to dissolve.

Acid Dyes

Acid dyes dissolve well in any kind of water and are, as a class, very fast to light. We know from their action on cellulose that they have small affinity for pure vegetable fibers—therefore, are only to be used on well-sized papers, the coloring being effected through the medium of a mordant, in this case alum in combination with rosin size. The dyeing, even on mixed stocks, is very level, because the color of the stock is imparted through an encrustation.

For light and medium shades, 1½ to 2 per cent of rosin size and 2 to 2½ per cent of alum are used. For heavier shades an increase in both is desirable, as it will produce better results, giving better exhaustion of dye. For the latter it is often wise to use 2 to 4 per cent soda ash (added with the rosin size) with a corresponding increase in alum. Care should be taken, however, in the use of such a dye as Metanil Yellow, which is sensitive to acid, and an excess of alum must be avoided.

Good results, especially with heavy dyeing, may also be obtained with the combination of acid and basic dyes leading to a mutual precipitation and consequently an almost total absorption of dye. In this case the acid dyes should be added to the beater first and allowed to mix before adding the basic dyes.

Direct Dyes

Direct dyes are superior to both basic and acid dyes in regard to light fastness, and are, in consequence, used where exacting requirements in this regard are to be met. These dyes are easily soluble in soft water. Where only hard water is obtainable, about half as much soda ash should be added to the water as dyestuff.

Direct dyes differ from acid dyes in that no mordant is required for them to be affixed to the fiber, and in consequence are suitable for both sized and unsized papers. They have, however, greater affinity for rag fibers than for wood, and consequently a blend is often made with acid dyes where there is a mixture of these stocks.

It is essential that the solution of these dyes be added to the beater cold, as the fibers first coming in contract with a hot solution will be stained more heavily, producing a mottled sheet. With direct dyes the alum should always be added last.

Vat and sulphur dyes, because of their fastness to acid, alkali and light, have also a limited application. They are, however, duller in shade than the other dyes mentioned. Vat dyes are usually shipped in paste form and in consequence are less easy to handle and somewhat expensive. Sulphur dyes, while not expensive, must be dissolved and require an addition of sodium sulphide; the stock must undergo a special washing treatment to rid it of free sodium sulphide before the addition of size and alum, to prevent the formation of unpleasant hydrogen sulphide.

Equipment of the Color Room

The color room has an extremely important function in the storing and preparing of dyestuffs—yet how often it is neglected! It is necessary, first, that the color room be dry, for in even a slightly moist atmosphere many dyes have a tendency to cake. The side walls should be fitted with shelves and the whole room arranged to store the dyes conveniently and in

such a way that the names of the dyes are conspicuous. A workable cross-section is given in the accompanying figure.

The kegs and tins may be easily removed and taken to the bench on which are placed the scales for weighing from a fraction of an ounce to one pound. Another scales weighing from one-half pound upward should be mounted on a truck that can be wheeled to the side of the required barrel, onto which the dye can be dipped out without disturbing the barrel.

For dissolving the color there should be preferably one or more copper kettles heated by indirect steam. But in the absence of these, ordinary wooden barrels, heated with steam pipes for preparing hot water, will do. An adequate number of galvanized or wooden pails, paddles and strainers complete the equipment.

Determining the Proper Dye

In determining the proper dye to be used, there should be borne in mind several points, namely:

1. Nature of stock.
2. Shade to be matched.
3. Special requirements, such as fastness to light, acid, alkali or bleeding.
4. Cost.

Nature of Stock.—Bearing in mind what has been said regarding each class of dyestuff, the proper group of dyes should be selected according to the nature of the fibers.

Shade to Be Matched.—With the full and comprehensive color cards put out by several dye concerns, this should not present any difficulty. If a red is to be matched, look until you find a red that, on similar fibers to those you propose using, will give the result you require.

Special Requirements.—Fastness of a sheet of paper to certain chemical reactions—as, for example, that required from a soap wrapper or wall paper—is mainly a question of selecting dyes which possess the necessary resistance to such reagents. If you do not possess the necessary knowledge it is well to rely on the advice and recommendation of your dyestuff house. By fastness to bleeding is meant that the color in a sheet of paper must not run out under the influence of moisture or steam. To meet this requirement, acid dyes should not be used. Direct and basic dyes may be used for light and medium shades. For heavy shades produced with basic dyes use twice as much tannic acid as dyestuff, adding this to the beater in solution after the dye has been properly circulated. The acid will affix large amounts of basic dye and will eliminate any chance of bleeding.

Fastness to light, as is generally understood, comprises all changes which may occur in the shade, after the paper is made, due to atmospheric influences. There are many factors which enter into this condition beside the nature of the dyestuff. Chief among these is the character of the stock used. Of the various fibers, ground wood possesses the least resistance to light and storing, changing from a cream white to a dull brown, and it is obvious that in a paper containing a considerable amount of this fiber this factor must be taken into consideration. Unbleached sulphite has a similar tendency; while, on the other hand, bleached sulphite and bleached rag stock are considerably more permanent and show little, if any, change. It is readily seen that it would be a waste of money to use fast dyes on a sheet composed of ground wood and unbleached sulphite.

Another thing which affects the permanency of the shade is the presence of iron in the alum, which, under atmospheric influences, assumes a brownish cast which is especially noticeable in the lighter shades.

Cost.—Attention to the cost of dyestuffs is a most serious consideration where dark colors are to be made. There should be a familiarity with the offerings of several companies in order to color the sheet at the least cost comparable with the quality desired.

The Two-Sided Effect

One phase of paper dyeing which probably gives more trouble than any other is the so-called two-sided effect.

This is the noticeable difference in depth of shade between the two sides of the sheet. This is too often blamed on the dye used. It is true that acid dyes are often offenders in this regard, and wherever this trouble appears direct dyes should be used. Basic dyes, too, will very often give satisfactory results.

Now, a fact in the physical characteristics of any surface must be borne in mind. If a portion of a smooth surface of any material be roughed up, that roughened area will appear lighter in color than the smooth area. Just how this applies to the case in point will be made apparent by an example from the writer's experience.

I was asked to make a report on conditions in a mill in the Central West which was having this two-sided trouble with its sulphite bond. The facts were: They were beating the stock two hours in the beater, followed by a treatment in the Jordan; the machine was running 300 feet per minute and four suction boxes and a suction roll were used. Now, this signified that with the short time in the beater followed by the Jordan, they were cutting the stock rather than brushing the fibers out (which is customary in the beating of bond stock), while the high speed at which it was run made it necessary to use all the available suction to get the water out of the sheet. This suction drew out considerable of the short-length fiber from the under side of the sheet and left a much rougher surface than that on the upper or felt side of the sheet. The lower or wire side was then lighter in tone than the felt side, due to the physical difference in surfaces. A change of dyestuff could not cure this trouble. What they needed to do was to slow the machine, thereby being enabled to decrease the suction or increase the beating capacity so that they could really beat the stock, producing a longer fibered sheet and less of the easily sucked out short fiber.

Dyes Most Suitable to Different Papers

The kinds of dyes to be selected for the various grades of papers are as follows:

1. *Rag and Sulphite Bond and Similar Papers.*—Generally in these papers more than usual permanency and good fastness properties are required. Basic dyes must then be eliminated and the choice be made principally from members of the direct group, although the acid dyes are used somewhat.

2. *Sulphite and Kraft Wrapping Papers.*—Here all basic dyes and most of the acid group may be used.

3. *Poster and Box Cover Papers.*—The same dyes as mentioned under (2) may be used, although more of the acid group are made use of because of this greater fastness to light.

4. *Blotting Papers.*—Usually direct dyes are used.

5. *Special Papers.*—One of the paper most particular in regard to fastness requirements is that used for such articles as porch rugs, etc. This, due to the strength required, is made from strong unbleached stock, as kraft pulp or Mitscherlich sulphite and sulphur dyes are generally used.

Pigments

Next to dyestuffs, the most important coloring matters for paper are the pigments. These are, as a rule, very fast to light and have the added advantage that they increase the weight of the paper by acting as fillers. They are, however, generally not as brilliant as dyestuffs. While coloring with pigments is a purely mechanical operation, it is at the same time necessary to pay attention to the chemical nature of these materials and the substances with which they come in contact, in order to see that no injurious action takes place. It must be borne in mind that while natural pigments are separated from coarse and gritty particles, they are never in as fine a state of subdivision as are those pigments produced by chemical means.

Chemically prepared pigments, such as chrome yellows, oranges and greens, Prussian Blue and Ultramarine Blue, are used to a large extent and are very satisfactory.

Natural organic coloring matters of both vegetable and animal origin, although formerly used to a large extent in the coloring of paper, are now very little in use, being supplanted by the coal-tar dyes. About the only one used to any extent is logwood, which is used for blacks in conjunction with iron salts and tannin mordants.

TRADE ITEMS

George F. Hasslacher, who recently returned from Europe where he made a study of the chemical situation in Germany, is now connected with the Philadelphia office of Roessler & Hasslacher Chemical Company.

The Chemical Foundation, Inc., has moved from its former address at 81 Fulton Street, New York, to new quarters at 85 Beaver Street.

United Dye Wood Company has declared the regular quarterly dividend of $1.50 on the common stock, payable April 1st to stock of record March 14th.

The Bluebird Dyeing Company has been organized at Paterson, N. J., with a capital of $50,000. Charles Singer, 492 E. Nineteenth Street, is representative. The company will operate a plant for silk printing and dyeing. Edward Ferdon, Glen Rock, N. J., and Charles Singer, are the incorporators.

The Textile Dyeing Company of America, Inc., has its new dyeing plant at Saddle River, N. J., almost under roof and expects to start dyeing and finishing of silk, silk and wool, and silk and cotton goods, and weighting, in August. The new structure is being erected by John W. Ferguson Company and adjoins the plant recently purchased by the Textile Dyeing Company from the Wagaraw Bleaching & Finishing Company.

Dyestuff Tables

A List of the Principal American-Made Colors with Their Properties and Fastness Characteristics

[NOTE: The publishers of The REPORTER have secured more or less complete data in regard to many of the dyestuffs which are at the present time being manufactured in the United States. As the following material has been brought together from various sources, they realize that errors are quite likely to appear, and it is earnestly requested that any readers who find errors or who are able to give additional information will communicate with the publishers in order that this material may be made as correct, complete and up to date as possible. These tables will appear serially, until all colors upon which we have data shall have been covered.]

FAST LIGHT YELLOW

(Schultz No. 19)

Properties Given Comparatively as Related to Tartrazine

COMPOSITION: Pyrazolone type.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: With Glauber salt and sulphuric acid or with bisulphate alone.

SHADE: G mark is redder than Tartrazine; 3G is much greener.

SHADE BY GASLIGHT: G, no change; 3G, duller.

SOLUBILITY: The 3G is better than the G.

LEVEL: The G mark is more level dyeing than Tartrazine or the 3G mark. (The 3G and Tartrazine are the same for level dyeing qualities.)

EXHAUSTS: 3G better than the G.

FASTNESS TO:

Acid: Both G and 3G are good.
Alkali: G is good; 3G greener and duller.
Carbonizing: Both good.
Chlorine: 3G fast.
Fulling: Fastness very moderate; all marks bleed badly into white wool. (Tartrazine the same, or very little better.)
Light: Both G and 3G better than Tartrazine.
Perspiration: G good; 3G turns slightly greener.
Steaming: Dry steaming good.
Sulphur: Good fastness.
Washing: Moderate, about the same as Tartrazine; bleeds off badly.
Water: Fairly good, but not as good as Tartrazine in this respect.

SENSITIVE TO METALS, LIME: Copper and iron dull the shade slightly.

MACHINE DYEING: O. K.

ON OTHER MATERIALS: Suitable for chrome-tanned leather; suitable for paper except dyeing in the beater.

COMPETING PRODUCTS: Made in the United States by E. I. du Pont de Nemours & Co., Grasselli Chemical Company, United States Color Company, National Aniline & Chemical Company, Pharma Chemical Company.

REMARKS:

Fast Light Yellow G: This color is very fast to light and also has good level dyeing properties and can be fed on at the boil. It is recommended for ladies' dress goods in combination with Azo Fuchsine and Alizarine Saphirol and Alizarine Rubinol for fashion shades in piece dyes.

It is suitable for printing wool pieces and also for Vigoureux printing.

Printed on silk, the color is not fast enough to water to be suitable.

The printed shade on wool does not discharge with tin crystals but discharges white with zinc dust.

Fast Light Yellow 3G: This product is faster to light than the G brand, but is not as level dyeing. It is also slightly more sensitive to copper and slightly faster to fulling.

It is suitable for wool-silk printing and discharge work with zinc dust or tin crystals, though the former gives the best discharge. The printed shade on wool is fairly fast to hot water.

Printed on silk, the color is not fast to water like the G.

In dyeing wool-cotton unions in an acid bath the cotton remains white.

In dyeing wool-silk unions the silk remains white. (The G brand does not leave the silk as clear.)

Fast Light Yellow 2G: The properties of this color lie between the G and the 3G.

FAST LIGHT YELLOW

(Schultz No. 19)

Properties Given by Description

COMPOSITION: Pyrazolone type.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: With Glauber salt and sulphuric acid or with bisulphate of soda alone.

SHADE: The G mark is slightly redder than Tartrazine; the 3G mark is much greener.

SHADE BY GASLIGHT: G mark no change.

SOLUBILITY: The 3G mark is more soluble than the G.

LEVEL: The G mark is more level dyeing than the 3G.

EXHAUSTS: The 3G mark exhausts better than the G.

PENETRATION: The 3G does not cover well.

FASTNESS TO:

Acid: Good.
Alkali: 3G mark turns greener and duller; the G mark is good.
Carbonizing: Good.
Chlorine: 3G mark good.
Fulling: Very moderate; all marks bleed badly into white wool.
Ironing: Good.
Light: The light fastness of the 3G is better than the G mark.
Perspiration: G good; 3G turns slightly greener.
Rubbing: Good.

Steaming: Dry steaming good.
Sulphur: Good.
Washing: Moderate; bleeds into white wool.
Water: Fair.

SENSITIVE TO METALS, LIME: Copper and iron dull the shade slightly.

MACHINE DYEING: O. K.

ON OTHER MATERIALS: Suitable for chrome-tanned leather; suitable for paper except dyeing in the beater.

COMPETING PRODUCTS: Made in the United States by E. I. du Pont de Nemours & Co., Grasselli Chemical Company, United States Color Company, National Aniline & Chemical Company, Pharma Chemical Company.

Fast Light Yellow G: This color is very fast to light and also has good level dyeing properties and can be fed on at the boil. It is recommended for ladies' dress goods in combination with Azo Fuchsine and Alizarine Saphirol and Alizarine Rubinol for fashion shades in piece dyes.

It is suitable for printing wool pieces and also for Vigoureux printing.

Printed on silk, the color is not fast enough to water to be suitable.

The printed shade on wool does not discharge with tin crystals but discharges white with zinc dust.

Fast Light Yellow 3G: This product is faster to light than the G brand, but is not as level dyeing. It is also slightly more sensitive to copper and slightly faster to fulling.

It is suitable for wool-silk printing and discharge work with zinc dust or tin crystals, though the former gives the best discharge. The printed shade on wool is fairly fast to hot water.

Printed on silk, the color is not fast to water like the G.

In dyeing wool-cotton unions in an acid bath the cotton remains white.

In dyeing wool-silk unions the silk remains white. (The G brand does not leave the silk as clear.)

Fast Light Yellow 2G: The properties of this color lie between the G and the 3G.

NAPHTHOL GREEN
(Schultz No. 4)

COMPOSITION: Nitroso type.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Glauber salt and sulphuric acid.

SHADE: Yellowish green.

SHADE BY GASLIGHT: Yellower.

SOLUBILITY: Good.

LEVEL: Does not dye level.

FASTNESS TO:
Acid: Good.
Alkali: Good.
Fulling: No change in shade with neutral soap.
Light: No change in shade after thirty days' exposure.
Sulphur: Shade turns slightly lighter.

DYED BY OTHER METHODS: Dyed chromate—very weak and yellower in shade; dyed top-chrome—no change in shade or properties.
On Unions: Wool-silk—the silk is left white.

ON OTHER MATERIALS:
Paper: Good for sized paper; fast to alkali.
Wood Stains: Suitable.
Pigments: Suitable.

COMPETING PRODUCTS: Made in the United States by the Amalgamated Dye & Chemical Works (Selling Agents, John Campbell & Co.); Dye Products & Chemical Company.

NAPHTHOL YELLOW S
(Schultz No. 7)

COMPOSITION: Nitro type.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Glauber salt and sulphuric acid.

SHADE: Shade very similar to Tartrazine.

SHADE BY GASLIGHT: No change.

SOLUBILITY: Good.

LEVEL: Level dyeing color.

EXHAUSTS: Well.

FASTNESS TO:
(The fastness is increased by treatment with barium chloride.)
Acid: Fairly fast.
Alkali: Fast.
Fulling: Not fast; changes shade and bleeds badly.
Ironing: Fast.
Light: Not at all fast to light; changes shades after a few days' exposure.
Perspiration: Fast.
Potting: Not fast.
Rubbing: Fast.
Steaming: Fast.
Street Dirt: Good.
Sulphur: Fast; bleeds very slightly.
Washing: Not at all fast; color bleeds off.
Water: Not fast.

DYED BY OTHER METHODS: Silk-white-effect threads, when dyed by the silk-white process, are left white.
On Unions: Wool-cotton—the cotton is left white; wool-silk—with acetic acid the silk is slightly stained; cotton-silk—with acid the cotton is hardly tinted.

ON OTHER MATERIALS:
Paper: Suitable; add to the unsized pulp. Used in conjunction with Auramine.
Silk: This color can be dyed on silk in a boiled-off liquor bath broken with acetic acid.
Cotton: This color is of no interest for this fiber.

PRINTING: The color can be printed on wool.

(Continued on page 175)

Proceedings of the American Association of Textile Chemists and Colorists

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JANUARY MEETING OF NEW YORK SECTION

The January meeting of the New York Section of the American Association of Textile Chemists and Colorists convened at 8.10 p. m., January 25, 1924, in the Mid-Town Restaurant, 56 East Forty-first Street, Chairman E. H. Killheffer presiding.

Chairman Killheffer—As you know, we haven't had a meeting since November and, unfortunately, to-night we are a bit incomplete, so far as business is concerned, because Mr. Hadley couldn't be with us, so we will have to dispense with such matters as the reading of the minutes, etc.

The first thing on our program this evening, then, will be Dr. Flynn's paper on "Testing Colors for Fastness to Light." Dr. Flynn presented this paper before the Providence Section and I asked him if he wouldn't be good enough to present it here again, so that we could listen to it rather than read it, and also see whatever he has to present in the way of illustrations of his method. He has very kindly consented to do that, and we will now hear from Dr. Flynn. (Applause.)

TESTING COLORS FOR FASTNESS TO LIGHT

By DR. OSCAR R. FLYNN

As Dr. Killheffer has explained, this is something that was given before and already published in the AMERICAN DYESTUFF REPORTER. It would hardly be proper to read the paper again, but I thought I would simply give a sort of resume of the results that we have found and cover the main points of the paper. We haven't very much that is new to contribute at just this time.

At the time the paper was first presented the essential part of the work, I think, was largely completed; that is, we felt that we had been able to modify action of the quartz tube mercury lamp so as to obtain essentially the effect of sunlight.

We have a number of lantern slides which we exhibited at Providence, and which perhaps made the subject a little clearer; but there are no facilities here for showing lantern slides, so we will have to get along without them. I brought with me a quantity of the original material and some tracings and blueprints which possibly we can use to illustrate some of the points by passing them around or showing them afterward.

The quartz tube mercury lamp has been used for a number of years, more or less tentatively, in testing dyes. As you know, quartz transmits ultra-violet of a very much shorter wave length than glass. Consequently, an electric arc confined within a quartz tube pours out on the external world more of this short-wave light than does an arc that is confined in glass, such, for example, as the ordinary carbon arc. It has been known that the light transmitted from the mercury arc exerts a very powerful actinic effect, causing sunburn and various chemical effects, and, of course, acts upon organic compounds having color in a destructive way, as shown by fading.

My first introduction to the use of the quartz lamp

was in a search for something by which we could make rapid light tests. I first tried some experiments with a lamp that was adapted for surgical use, one of the Hanovia lamps. I tried it first on cotton dyes and seemed to get results that were useful, paralleling in a general way the effect of sunlight. I was led to continue my tests and for some time in our laboratory we prepared sheets of dyed strips, using every dye that was tested in the laboratory. These sheets were exposed to the mercury lamp and it soon became evident that there were anomalous effects.

For example, taking the most pronounced case, we found that basic dyes appeared to be much faster than the ordinary cotton dyes. In that respect there was a complete reversal of fastness; and, furthermore, there were other peculiar effects. The so-called light-fast or "L" brand of colors in some cases showed irregular results. Solamine Red took on a purplish tint; which, however, was not permanent. On putting the sample away in a dark place it disappeared, and the resulting fading then appeared like a sunlight fade.

Vat colors, in some cases, exhibited peculiar effects. The Indanthrene Yellow G turned green. It was the effect on the Indanthrene Yellow G that gave some clue as to the cause of the peculiar results. It appeared that it was due to some sort of a reduction action, evidently caused by the cotton acting on the dye.

In following up that line I came across an article in the Journal of the Society of Dyers and Colourists by a Mr. Harrison. This was not, curiously enough, mentioned in any of the bibliographies on fading, although it was not published so very long ago. I think it was published in about 1910. It is quite an extensive investigation on the effect of ultra-violet light in fading. He carried out a number of experiments with dyes in quartz tubes from which the air had been exhausted or in which the air had been replaced by various gases. He summarized the results something like this:

First—In the majority of cases dyes do not fade in the light of the mercury lamp in the absence of air and fiber. He filmed the dyes on bits of glass rod, inserted those in quartz tubes, exhausted the air and exposed them to the mercury light. He found that the majority of the dyes did not fade. The only exceptions were dyes that contained nitro groups, which seemed to fade by an internal oxidation and reduction.

Second—He drew the conclusion that azo dyes would fade in the absence of air, provided fiber was present.

Third—There were other dyes which would not fade in the absence of air, although in contact with the fiber.

His conclusion from his experiments was that fading was the result of two effects: a reducing effect and an oxidizing effect; and that these effects were unequally accelerated. The reducing effect, as the light intensity increases, was much more rapidly accelerated than the oxidizing effect. This is due to the difference in concentration between the fiber substance, cellulose, for example, and the oxygen of the air.

If you try to oxidize iron by air a rise in temperature increases the rate of oxidation to a certain extent, but finally the rate is determined solely by the concentration of the oxygen in the air.

In the same way, the fading due to oxidation is limited by the concentration of the oxygen. However, the fading due to reduction is limited by the concentration of the cellulose or other fiber material; and as the latter is probably a thousand times more concentrated than the oxygen of the air, there is practically no limit to the rate of fading which can be developed by increase in light intensity where the fading is due to a reducing action.

Harrison's work seems to furnish a rational explanation of what we observed in these series of tests; such, for example, as to why the direct colors faded very rapidly, and the basic colors, which could not be destroyed readily by reduction, faded quite slowly. Harrison's work has tended to show that the anomalous effects of the mercury lamp were not due mainly to a peculiar quality of the light but rather to its intensity.

Following out that idea, we set about slowing down the action of the lamp. It occurred to us that the easiest way to slow it down would be to cut down the voltage and to remove the lamp to a greater distance from the sample. We carried on some tests, using a 110-volt lamp, which was one-half the voltage, and removed it about 3 feet from the sample, the original tests having been made much closer.

A considerable degree of equalization resulted, although there was not what we might call a complete balance. What's meant by "balance" may be explained as follows: If you take a set of samples and expose them first to sunlight, then to the artificial light until any one of them selected as a standard has faded to the same extent as the sunlight sample—if the other samples are found to be faded the same as the sunlight exposed sample—we have balanced fading.

In this case there were still irregularities which would tend to show that while Harrison was right in that the peculiarities or anomalous effects were partly due to the rapidity of fading, still there must have been some specific effect due to the very short wave lengths that were not present in sunlight which caused irregularities. Our experiments were then directed not only to cutting down the rapidity of fading but to cutting off what we call the "far ultra-violet"; and that re-

quired nothing more mysterious than imposing a film of glass between the sample and the source of the ultra-violet light, which we did and made a number of tests.

Our experiments were made, first, on the direct and basic colors dyed on cotton, with the result that we obtained this desired balanced fading. That is, by first exposing the samples on the roof all together for the same length of time and registering a certain amount of sunlight fading, and then putting them under glass and exposing them to the lamp and fading them until one particular dye selected as a standard was faded the same under the lamp as under sunlight, we found that all of them, including the basic dyes, were faded, so far as the eye could judge, to the same extent. This was, of course, a distinctly encouraging result, as it seemed to show that we were on the right track. In fact, we considered the problem of tempering the mercury arc to be solved, as we knew that animal fibers exert apparently much less effect on dyes than cotton, even Congo Red showing a fair degree of fastness on wool.

However, to test the matter further we prepared or obtained a number of dyeings on silk and wool, both acid and alizarine, exposing them in the same way, with the idea of testing out the effect of the glass. We found, so far as we could see, that simply interposing this sheet of glass did away with all the anomalous effects of the mercury lamp. This series included vat and alizarine dyes on cotton.

This covers about all that we have actually done that bears on the subject. We have been experimenting still further, using other kinds of glass, to see whether we can get a higher degree of refinement; for example, using glass tinted with cobalt and nickel, which cuts off a considerable quantity of the blue light that comes through from the mercury lamp.

We thought that we did notice a slice retardation in the blue or in dyes that transmitted blue, but we haven't any results yet to report on that line.

To summarize, the mercury arc emits light having the same quality as sunlight and also ultra-violet light of shorter wave length, such as does not penetrate the atmosphere and get down to earth; that this light transmitted through quartz from the mercury arc, acting at short distances, produces peculiar effects; but by slowing down the intensity and cutting off the shorter wave lengths, by passing the light through glass, we get essentially the effect of sunlight.

We have here this evening some of these results—the actual fadings; also some charts. I presume the best way to do would be to wait until the other speakers are through, and then those who are particularly interested may look at them. We will be very glad to show them and to discuss the results.

Thank you. (Applause.)

Chairman Killheffer—Before we ask for any discussion I would like to ask Dr. Flynn something. In the original paper didn't you give a short description of your method of making light tests; that is, how you faded one color against another? I think that would be rather interesting, if you would give it to us very briefly. You gave a method in that paper, I believe, whereby you exposed one color to the sun and took the number of hours, and then faded another color to the same extent, graded one against another—do you know what I am referring to?

Dr. Flynn—We did make tests along those lines—that is, exposing all the samples to sunlight together and then exposing them to the ultra-violet lamp until we thought that we had a balanced fading, fading each one separately in that way. I am not sure that I spoke of that particular method, although we carried on tests of that kind. But it only served to show that, in judging on the question of fading, it is sometimes quite difficult to see any difference between the fading of a certain number of hours and the fading of 25 per cent more time than that. In other words, the eye very often will see results as faded to practically the same extent when, as a matter of fact, they are not.

Most of our results were obtained by using a single color as a standard and fading until that particular standard was faded artificially as much as it was faded by sunlight, all the samples being faded the same under sunlight, and then judging by the eye as to whether the others were or were not faded equal to the sunlight fading.

We are now actually carrying on some experiments in which we are re-examining our results, using this color analyzer of Keufel & Esser and trying to develop a method by which one can mathematically measure the fading.

Mr. Buttolph told me that he had with him here this evening some of the curves which had been secured by examining some of the fadings. I haven't seen them myself yet, but he may be willing to show them. I don't know just what they prove.

Chairman Killheffer—We will ask him if he has anything to say on the subject right now.

Mr. Buttolph—I have simply performed the physical chemical developments in Dr. Flynn's work. I deliver the material to him for analysis.

Perhaps you are familiar with the Keufel & Esser color analyzer. It really represents the industrial development of things worked out at the Bureau of Standards, by which it is possible to take the color reflectivity curve through the whole spectrum of any particular dyed material.

The charts I have here you can see after the meeting.

You will note on them some very interesting things. For example, on a single chart there is shown the reflectivity curve of the original material; of the material as faded by sunlight, as faded by the direct quartz mercury arc and as faded by the filtered mercury arc. These curves show up graphically the difference in these fading effects.

In some cases you will see the way in which the unfiltered arc faded in the blue end of the spectrum, while the filtered arc faded relatively more in the red end of the spectrum—differences that cannot be picked out by judging with the eye.

Chairman Killheffer—What I had in mind, Dr. Flynn, was that you made a suggestion for a method of picking out one color or a group of colors. I think you took one color, didn't you, and gauged the fastness of other colors as compared with the fading of that one? At least, you were using one color to measure the degree of fastness of others, weren't you?

Dr. Flynn—We did use a standard. In fading, we used Scarlet 8BS as a standard merely to measure the length of time of fading, to tell us when that particular set was finished. When the Scarlet 8BS had faded so as to balance up with the sunlight, we considered that the fading test was complete, and it was a question then as to whether the other colors had faded the same amount or more.

We used that from the very start in experimenting with the direct mercury arc, and we found in that case that basic dyes, for example, were never faded to anywhere near the same extent as the direct dyes. When the Scarlet 8BS had faded, most of the other ordinary direct dyes had faded the same amount, even under the direct mercury lamp. Some of the basic dyes did not show any effect at all. This, of course, required only a very short time; in a half hour, under the direct lamp, you would get decided fading of the ordinary direct dyes.

We also observed that when the Scarlet 8BS faded, Fast Red 8BL, for example, was not faded quite as much, although the tendency was for the fast colors to fade almost as much as the non-fast ones. There was just a little bit of retardation there; it didn't show them up as anything very superior so far as fastness is concerned—that is, under the direct mercury lamp.

The same thing was true of some of the sulphur colors. The colors seemed to be reversed in fastness in the case of basic dyes, where there was a tendency to bring them all to a common denominator of the fading and make everything more or less of the same degree of fastness. But, of course, when we tried the filtering of the light, tempering of the mercury arc, those effects completely disappeared. But we used a standard, as you rightly said, in all of these tests.

Chairman Killheffer—I still haven't made myself entirely clear. What I had in mind was this: Didn't you propose a method of using one color as a standard; exposing it, if you please, to direct sunlight at a certain time of the year—a long strip of it—and fading it for one hour, two hours, five hours, ten hours, or whatever it was—

Dr. Flynn—No.

Chairman Killheffer—Perhaps it was someone else, then, who told me of that scheme. Whoever it was that told me about it, he proposed taking a certain color, fading a long strip of it, fading one part of it a few hours, then another for a greater number of hours, and getting a gradation of colors in direct sunlight. Then, any time they wanted to estimate the fastness of another color they would take a piece of dyed material of this standard color and expose by its side a dyed sample of the color under examination; they would expose it perhaps at an entirely different time of the year, perhaps not even in direct sunlight, and would fade it to whatever point they wanted. They would be able to measure the equivalent of hours of direct sunlight by comparing it with this graduated scale that they had made previously of the fadings of so many hours.

I thought it was you who had proposed that method.

Dr. Flynn—That is a very ingenious method and I think I heard it described here. I wouldn't dare claim it as my own invention. The inventor may be present, for all I know.

Chairman Killheffer—I don't recall, then, who proposed that.

Is there any discussion on this subject? Has anyone any questions he would like to ask or any remarks he would like to make?

Mr. Gordon—Do you think that standard which you are speaking of would be sufficiently permanent to be used satisfactorily?

Chairman Killheffer—That is a question I asked whoever it was that told me about it. I think the answer he gave me was that they would, after a great deal of care, select a color that would store well, that had a great deal of fastness, and something that would be quite permanent, and then would measure all other fading against it. As Dr. Flynn said, it is a very ingenious method. I thought it was he who had suggested it.

Dr. Matthews—I would like to ask what is the relative time exposure to obtain the same results between the sunlight and the lamp.

Dr. Flynn—It varies with regard to the time of the year. In the winter the ratio between sunlight and the lamp, with regard to rapidity, is about 2.4 to 1. But in the summer—we made our tests, I think, in May and

June, and I believe we made our series of tests with the wool and silk—we found that it took eighty-five hours of the tempered mercury arc to equal one hundred hours of sunlight, making it equal to about 1.2 to 1. It is about twice faster in the winter than it is in the summer, relative to the sunlight.

Dr. Matthews—I asked that question because, unfortunately, I happen to be chairman of a committee that works with the War Department in getting up fast olive-drab uniforms and we are trying to find whether there is a method to test the sample submitted to see if it will stand tropical sunlight for two or three months.

Dr. Flynn—Perhaps I did the direct mercury arc a little injustice in some of the remarks I made. The very fast sulphur colors, or all the colors of the very highest degree of fastness, resist the direct mercury arc and it offers a means of sort of an eliminating test.

If you had to make a selection of fast colors quickly and you selected colors that withstood six to eight hours of direct mercury arc at a distance of 9 inches, 220 volts, you could safely expose those colors to tropical sunlight, or on top of the Himalaya Mountains, or any place you wanted to, and be quite certain they would resist the action of sunlight. But in so doing you might discard dyes which were very good in their way.

Dr. Matthews—In our tentative specifications we have put in an exposure of seventy-five hours to a Fade-ometer test.

Dr. Flynn—That is about equal to eighty-five hours of the 220-volt quartz lamp at a distance of 9 inches through glass.

Dr. Matthews—Do you think a color that withstands that will stand two or three months' sunlight in the tropics?

Dr. Flynn—You could say that it would stand 100 hours, probably, of summer sun in this latitude. The sun in this latitude is probably not anywhere near as intense as the vertical sun in the tropics at the same time of day. We have found that we can practically discard the rest of the day, except from nine till three, because in the morning and afternoon the slanting rays seem to have very little punch to them.

Dr. Matthews—We are having a lot of dyed material made up into uniforms and they are going to be sent down to Panama to be actually worn in the tropics for three months. We would like to get, if possible, some laboratory tests of fastness to light on the same cloth, and then at the end of three months' actual wear see how they compare; that is, how the laboratory tests compare with the actual wearing tests.

Do you think that would be at all reasonable?

Dr. Flynn—I don't think that seventy-five hours of Fade-ometer or eighty-five hours of the mercury lamp would be equivalent to three months of tropical sun.

Dr. Matthews—That is what I am afraid of.

Dr. Flynn—You would have to give it longer exposure than that, I think.

Chairman Killheffer—A couple of hundred hours, I should say.

Mr. Buttolph—May I make a suggestion in that connection?

In photochemical work, neither the filtered Uviol arc, as Dr. Flynn has reported the work on it, nor the Fade-ometer (which is a violet flame carbon with a glass globe around it) will give light physically equivalent to sunlight; that is, tropical sunlight. There is, particularly in direct tropical sunlight, a quantity of ultra-violet which you cannot get through any glass-enclosed arc, and that particular ultra-violet we find very effective for photochemical changes.

There are in New Jersey several installations of quartz lamps used for chlorination reactions, where they are using just that difference. They report results using ordinary incandescent lamps, but by using direct sunlight, such as you get in New Jersey, for these chlorination reactions they get much more remarkable results.

So it would seem, in fading tests for tropical work, you ought to have this shorter light.

Dr. Matthews—Is your plan to use the unfiltered mercury arc?

Mr. Buttolph—The unfiltered mercury arc goes even beyond that. It gives you a lot of short light you don't even get in tropical light, but it would be a factor of safety.

Chairman Killheffer—Are there any further remarks on the subject?

Following somewhat the line that your thoughts were taking on the subject of Government khaki, at the Providence meeting Mr. Claflin presented a paper on the subject of olive drab and he said that in considering the subject it seemed to him that everyone had apparently confined himself to certain well-known methods of getting that shade, and so, for a reason that he wasn't very well able to explain, he decided he would like to know whether there really was another method by which he could obtain olive drab of sufficient fastness.

Then he went on to describe some experiments he had made with Primuline chlorinated. I was very much interested in what he had to say and asked some of our men in Passaic to get to work and follow that up a little bit to see whether they could make combinations using Primuline with a product like Anthrene Black, Anthrene Green B (which on chlorination will turn black), and whether they could get any results

that might afterward be translated for practical work. They have been doing quite a little on that subject and I asked Mr. Unterweiser if he wouldn't write up what he had done so far and present it here to-night.

Mr. Unterweiser—Gentlemen, before presenting this paper I want to say the time was too short for me to get all the experiments that I wanted to get to show you. However, I was able to get quite a few which I believe will be interesting to you. I haven't been able to get a light test completed, but what I have on that was about sixty hours under the Fade-ometer. I had to take that out at 4 o'clock this afternoon.

PRIMULINE AND VAT COLORS FOR THE PRODUCTION OF FAST KHAKI SHADES

By Joseph S. Unterweiser

Supplementing the paper given by Alan A. Claflin at the annual meeting held in Providence, concerning the production of khaki by using Primuline in conjunction with Vat Green chlorinated, I thought, in view of the fact that quite a number of the members of this Section were not present at the meeting, that a discussion on this subject would be appropriate.

In conducting my experiments I have followed Mr. Claflin's lead. However, I discovered that the correct Government shade of khaki could not be produced with Primuline and Anthrene Green B alone, but that a red was also necessary. Therefore I selected Indanthrene Bordeaux and found that this combination worked very well. The Government shade was very closely matched by using Primuline in conjunction with vat colors chlorinated, sulphur colors aftertreated with chrome, acetic and bluestone, and also with vat colors exclusively, Anthrene Yellow G, Anthrene Blue GCD and Indanthrene Bordeaux. Of course, these colors were not the ones that were used for making the Government shade of khaki previous to the war; that combination consisted of Indanthrene Violet RN Extra, Indanthrene Golden Orange R, Indanthrene Blue GCD and a small portion of Indanthrene Yellow G. I have used the combination named above, as these colors are very easily obtainable.

Upon comparing the fastness properties of the three different combinations I find that the combination made with the Primuline base is much superior in many instances to both the sulphur and vat dyeings. In the vat dyeing it seems that the yellow is the chief offender. I want to call your attention to the fact that although the Primuline came down considerably in strength in the boiling soap bath given at the completion of dyeing, it held up remarkably well in subsequent soapings.

The cost of the Primuline combination is lower than that of the vat colors exclusively, considering the materials only. However, the extra handling of the material in chlorinating would naturally increase the cost. The tests were made using a mixture of 3 grams Primuline, 1 gram Anthrene Green B Double Paste and ¼ gram Indanthrene Bordeaux. To this was added 12 c.c. caustic soda (1-10) and a like amount of water. This was heated to 140 deg. Fahr. and allowed to stand for twenty minutes. Six hundred milligrams hydrosulphite was then put into the liquor, 30 c.c. common salt (1-10) added and also 1 c.c. of ordinary joiner's glue. Enough water was added to bring the volume up to 100 c.c. A piece of bleached cotton cloth was put into the liquor and worked for twelve seconds. It was then withdrawn and put immediately into a chloride of lime bath (2 deg. Tw.) and allowed to chlor for thirty minutes. At the expiration of this period the regular vat finishing method was employed; namely, antichloring with bisulphite of soda and soaping at the boil for fifteen minutes. The glue was used to retard the action of the vat color and also to aid in obtaining a level result.

It is of greatest importance that a temperature of about 140 deg. Fahr. be maintained while running the goods through the dye liquor. A higher temperature results in the taking up of too much Primuline. It was ascertained by experiment that a temperature of 140 deg. Fahr. assures a fairly even exhaust of the colors in the combination.

As a working formula on a large scale I would suggest the following:

For 100 gallons liquor:

14 pounds 12 ounces Primuline.
4 pounds 10 ounces Anthrene Green B Double Paste.
1 pound 4 ounces Indanthrene Bordeaux.
15 pounds common salt.
3 pounds hydrosulphite.
6 pounds dry caustic soda.
1 pound glue.

The results of the fastness tests which were made are as follows:

No. 1—Boil for ten minutes in a solution of 80 grams of laundry soap to 1 pint of water. All colors practically held their shade.

No. 2—Boil for ten minutes in a solution of 20 grams dry soda ash to 1 pint of water. The Primuline combination was not affected, but the vat and sulphur colors changed in shade considerably.

No. 3—Steeped for twenty-four hours in hydrogen peroxide (10 volume). All colors practically held their shade.

No. 4—Steeped for twenty-four hours in lactic acid.

specific gravity 1.21 U. S. P. The Primuline combination was superior in this test to both the vat and sulphur colors.

No. 5—Steeped for twenty-four hours in citric acid. The Primuline combination was superior in this test to both the vat and sulphur colors.

No. 6—Steeped for twenty-four hours in cold water. All the colors practically held their shade.

No. 7—Sixty hours' exposure in the Fade-ometer. I was forced to make the light test under the Fade-ometer instead of the usual thirty days' exposure under glass, as I did not have the time to expose them to light. I had to take the tests out of the Fade-ometer at 4 o'clock this afternoon, and up to that time none of the colors showed a fade distinct enough for me to be able to tell you which of these combinations would be the fastest to light.

No. 8—Steeped for one hour in 2 deg. Tw. solution of chloride of lime. This test, however, is not required by the Government. The Primuline combination is very much superior to both the vat and sulphur colors.

In conclusion, I wish to state that my experiments were made having in mind the production of the shade in the jig or padder and I believe that this method is a practical one. I also believe that warps and raw stock could be dyed with this combination. However, the formula would have to be adjusted to meet the conditions.

I have some tests here of the dyeings that we made; they are marked, and if any gentleman would like to look at them I will pass them around.

Chairman Killheffer—This investigation of the use of Primuline for making khaki shades is, of course, not complete by any means, but if you will look at the tests as they come around I think you will be rather startled at the very excellent fastness of the Primuline vat combinations.

This work, as Mr. Unterweiser has said, was done with the view of ascertaining if the method could be used practically for padding or on a pad jigger. I think that one mill is going to make an experiment with a few pieces at least to see whether it can be done; and, of course, if they try it out we will probably have some further results later, providing the mill is willing to tell us about them. If they fail I suppose they will be perfectly willing; if they are successful, perhaps not. (Laughter.)

Is there any discussion?

Dr. Matthews—Have they done enough work on that to see how uniform the dyes are? We had a talk with Mr. Claflin on it some time ago and there seemed to be a little trouble about evenness of dyeing.

Chairman Killheffer—That is what we were trying to work out—to see whether they would dye sufficiently level so they could be applied on a pad. Apparently at first it looked as though there would be great difficulty. As I see it now, perhaps the greatest weakness of the thing is that rather close temperature control must be exercised or you will have an uneven exhaustion of the colors used in combination, although I understood from Mr. Unterweiser that if the temperature were kept not to exceed 140 deg. Fahr. they worked well together.

Dr. Matthews—It would be very interesting if that could be worked out.

Mr. Warner—I would like to ask the speaker what quantity of material is figured for that table he gave.

Mr. Unterweiser—One hundred gallons of liquor. I was figuring on the padder, a padder and a jig. It wasn't figured on the weight of cloth—just on the liquor.

Mr. Warner—We have found, for instance, that we can give the Government exactly what they want with a vat combination a little different from what you spoke of. By using Algol Brown and an olive we have been able to get good results, but the cost has been out of sight, because the Government always takes cost into consideration as well as the practicability of the thing, and that is bound to be an important factor when the Government gets ready to buy cloth.

Mr. Unterweiser—In pre-war days they used orange to take the place of the yellow. It seems that yellow is the chief offender, so far as the Government tests to which they are submitted are concerned.

Dr. Matthews—I take it that in your work the chlorinated Primuline is the major color constituent; that the vat dyes are used simply for tone.

Chairman Killheffer—Yes; and that ought to help materially in keeping the cost of the khaki down. Of course, you can't tell very much from laboratory results of that kind until you are able to get some practical confirmation as to whether the thing will function at all when you try to put it into the works.

Dr. Flynn—It occurs to me that if you pad a mixture such as you describe, of vat colors and Primuline, that you will find you will get an uneven exhaust.

Primuline is a very rapidly exhausting color. I know that it will dye on a cotton cloth so as to leave practically a colorless solution, and I don't believe there is any vat color that will exhaust at anywhere near the same rate. Of course, that is a great difficulty and one that has to be overcome in dyeing sulphur colors—the unequal exhaust. That doesn't show in the first few pieces that are run, but in a long run it presents a very, very difficult problem, unless colors are very carefully selected with that in view, and it occurs to me that Primuline and a vat color would be just the sort of combination that would not run uniformly.

Mr. Unterweiser—Answering that, I would like to men-

tion that in combinations dyed at a temperature of 140 deg. Fahr. the Primuline will not exhaust as rapidly as it will at the boil.

In our case we found we had to put some glue in to keep the vat colors from going on too fast. We did not find that the Primuline would go on faster than the vat colors at that lower temperature.

Dr. Flynn—Did you make repeated dyeings? That is, did you dye one swatch after another so as to test out these results?

Mr. Unterweiser—We made two exhaust tests and found that the shade held fairly well. All the dyes exhausted to about the same degree.

Dr. Flynn—Was the dye solution nearly exhausted after the third test you made?

Mr. Unterweiser—There was still some color in the bath. We had not replenished it. I would say about 60 per cent was exhausted. It seemed to me as though there was about 40 per cent of the color left.

Dr. Flynn—And still, exhausting 60 per cent, you found fairly even exhaust under those conditions?

Mr. Unterweiser—Yes; I mean that all the colors appeared to be exhausted equally.

Chairman Killheffer—What was the color before you dyed your second and third swatch? What was the color of the swatch when you took it out?

Mr. Unterweiser—It was about the same tone, except that it was weaker.

Chairman Killheffer—That is what Dr. Flynn was trying to bring out—whether it kept its tone or not. I wanted to ask that, too, because I didn't remember seeing any tests like that.

Mr. Jones—Would it be possible to work out a slop-padding method?

Mr. Unterweiser—I don't know. We would have to go into it and see.

Mr. Jones—You might get away from that difficulty in that way.

Dr. Matthews—I don't think slop-padding would give you sufficient penetration. The stuff has to be very well penetrated.

Mr. Warner—Mr. Chairman, from the discussion that has come up on this question we can see that it is one in which we are mostly all interested. There has been so little published about the work of this committee, that is apparently authorized by the War Department, that, in common with a number of other finishers of cotton piece goods, I would like very much to know if this question of testing goods in the tropics is going to be a free-for-all, because it appears that as time goes on there are going to be more and more interesting combinations of colors that ought to be tested if we want to get at the bottom of the thing when the army starts to wear these uniforms. I wonder if Dr. Matthews can enlighten us on that.

Dr. Matthews—We have had a number of dyeings made on Government specification cloth, using combinations of sulphur colors, vat colors, and some others, and at present we are having these made up into uniforms and they will be worn in the tropics, giving about three months' wear, and the results of those various colors will be followed up.

There seems to have been some inquietude among some of the dyestuff people and also the dyers on the score that the committee was having this thing done in connection with some special lot of cotton finishers. But there is no trouble to be expected on that score, because we have tried out—for instance, with the sulphur dyes a very large number of tests were made on a great many sulphur dyes—a great many dyes and the fastest ones were selected, irrespective of where they came from.

In the case of the sulphur dyes alone, it doesn't narrow itself down to any special brand of sulphur dyes. There are a number that are just as fast as the others; and, of course, the War Department is only interested in getting the color on the goods. It is not interested in what dyes are used. Any combination of dyestuffs, anybody's dyes—vat dyes, sulphur dyes, direct dyes—can be used; and we will use them, provided they meet the specifications for fastness. The War Department will not, I think, draw any specifications limiting the color to the use of any certain dyes, but will simply state the color and the specifications which the color will have to stand. And any dyer will be free to get any dye he wants to and dye them for that shade, and if they will stand those specifications they will be all right.

You can get mineral dyes, vat dyes, or any old dye at all, so long as it will meet the requirements of fastness that is naturally to be expected for that kind of work.

But bear in mind always that the army uniform has to be worn under conditions that ordinary clothing does not. It has to stand wear in the tropics and under very severe conditions; it has to stand exposure to weather. It gets rained on and it gets dried out in the hot sun, and all that kind of thing.

Another thing you must bear in mind is this: We must have a uniform for our soliders that is as fast as the uniforms of any other nation. We can't therefore use dyes, even though they are made in America, if they are not fast enough, because we cannot be criticized, as compared with other nations, for using colors in our uniforms that are not fast.

The army's only desire is to get fast colors. It has no concern as to what colors are used. If this Primuline combination will work it will be very good and the dyers will be supposedly free to use it. It doesn't, as I say, make any difference what colors they use.

Chairman Killheffer—Dr. Matthews, isn't it true—and I think this is one of the thoughts Mr. Warner had in mind—that the cloth that is to be subjected to the three

months' wear in the tropics is being done more as a preliminary to the writing of new specifications than anything else?

Dr. Matthews—That is true.

Chairman Killheffer—In other words, they want to write new specifications that will fit those conditions. After that, anyone is free to submit cloth of the proper shade, just so it will meet the specifications.

I remember I was present at one of those meetings when General Bellenger was there. He said that some of the previous specifications—lactic and citric acid, and some of the others—had been written on the assumption that our soldiers, many of them, might be frightened to death when they heard the first gunshot, but that they were working now on the theory that they wouldn't be so scared, so they were eliminating some of those particular tests. (Laughter.)

Dr. Matthews—We have recommended the elimination of the chlorine-bleaching test because that might of itself limit certain colors which otherwise might be quite satisfactory.

Chairman Killheffer—Of course, in that connection you remember that one of the representatives of the War Department said they would also have to eliminate the 10-cent can of chloride of lime (laughter), because the "rookie" looked like a veteran after his second week in the army if he gave his suit a bath in chloride of lime solution.

Chairman Killheffer—The time is going right along, so I think we had better have the other paper right away. One of the men in our laboratory had an idea in connection with dyeing vat colors, and that was in connection with using hydrogen as a reducing agent. He has been doing some work along that line, and as it was a rather novel thing I asked him to prepare a paper on it which would sum up at least the work that he has done so far. Of course, that is a subject that is still much more speculative than the matter of using Primuline for making khaki shades.

Mr. Warshaw, we will be glad to hear from you now. Mr. Washaw isn't a member, but we will provide him with an application blank.

Mr. Warshaw—Mr. Chairman and Gentlemen: Before starting this paper I would like to say that, not being a member of this Association, I consider myself rather fortunate in having this opportunity to tell you of what I believe to be a new method of reducing vat colors, and I want to thank Dr. Killheffer for the opportunity he has given me.

THE USE OF HYDROGEN GAS IN THE DYEING OF VAT COLORS

By Floyd F. Warshaw

A few months ago I had occasion to be in a mill in Massachusetts and while there met the dyer, a man who had been using vat colors for the past ten years. In the course of our conversation he told me of the trouble he was having in dyeing vat colors in warps. It seemed that unless a substantial quantity of hydrosulphite was fed, from time to time, into the vat, while an end was being run through, the results obtained would not be satisfactory. He insisted that in a machine of the type in which the goods passed in and out of the liquor the subsequent additions of hydrosulphite were necessary to maintain a perfect state of reduction in the color. You can readily see the increase in the cost of dyeing the excess hydrosulphite made. This little conversation set me to thinking of a way of overcoming this dyer's trouble. It was then that I conceived the idea of using hydrogen gas as a partial reducing agent for vat colors. My work in the way of experiment in this process is far from complete and has been limited to the laboratory. It has not, to my knowledge, ever been attempted in the dyehouse. At the invitation of Dr. Killheffer I wrote this article and a brief report of my work follows:

My first experiment was with Anthrene Yellow G because of the unmistakable change in color of the reduced vat; namely, from a clear yellow to a deep blue shade. I took 1 gram of the paste, added 12 c.c. of a 10 per cent solution of caustic soda and ten times as much water. This was heated to 140 deg. Fahr. and allowed to stand for ten minutes. The hydrogen line was then introduced and gas allowed to circulate through the liquor. This had been going on for no more than five minutes when a noticeable change in the color of the liquor took place; that is, from a bright yellow to a very weak olive shade. This grew more intense as the gas continued to enter the liquor. After twenty minutes a deep olive shade was produced and no further change took place. A skein of yarn was placed in the vat for five minutes. The result upon oxidizing and finishing was a yellow tint, fully as bright and clear, though lacking the body and strength, as one dyed with hydrosulphite.

In another case the gas was generated more quickly and allowed to pass into the vat for fifty minutes. The result was the same as in the previous trial.

A repetition of the first attempt yielded the same olive color in the vat, denoting a partial state of reduction. At this point a very small volume of hydrosulphite solution was poured into the vat and an immediate change to a blue took place in the color of the liquor. The vat, however, was not yet in a perfectly reduced state. An additional quantity of the hydrosulphite was added until the color was properly reduced. In all 2 c.c. of a 10 per cent hydrosulphite solution had been added. A skein of cotton yarn was then dyed and the result obtained checked in strength and shade with one that had been run with three times the amount of hydrosulphite and in the usual way.

The "hydrogen assist" process of dyeing vat colors, as I called this method, did not affect the fastness of the colors that I tried; namely, Anthrene Yellow G, Anthrene Jade Green and Anthrene Blue RS.

In another test I prepared two separate solutions of Anthrene Yellow G. The first was reduced in the usual way, while the other was reduced by the hydrogen gas and hydrosulphite method. These were allowed to stand for twenty-five hours. At this time both liquors turned from a blue to a muddy olive, indicating that the color had precipitated out of the proper dyeing solution. I infer, due to the fact that both liquors lost their dyeing properties at about the same time (not losing sight of the fact that one experiment was run with the usual amount of hydrosulphite, while the other had one-third the quantity, in addition to the hydrogen), that a saving of 66 per cent in hydrosulphite is effected and at the same time I believe that with the use of hydrogen the annoying features of having to continuously keep watch over the dyeing bath to determine whether an additional quantity of hydrosulphite should be added so as not to allow the color to precipitate out of solution can be eliminated.

The gas used in these experiments was obtained by the use of a Kipp generator. The materials used were impure zinc and commercial hydrochloric acid. Eighty grams of zinc and 60 c.c. of concentrated hydrochloric acid were employed in each case. The gas was passed through a wash bottle prior to its entering the dye vat. This insured pure nascent hydrogen.

In another case a piece of charcoal was placed in a hydrogen chamber and allowed to remain there for thirty minutes. During that time the generator kept feeding nascent gas into the chamber. At the expiration of this period the charcoal was removed and placed in a vat containing 1 gram of Anthrene Yellow G, 12 c.c. of a 10 per cent caustic solution and ten times that amount of water. The charcoal was allowed to remain in the liquor for thirty minutes. There was no change in the color of the vat. This showed that a direct flow of the gas is necessary for the best results. I was not able to determine whether the piece of charcoal was large enough to absorb sufficient hydrogen to partially reduce the vat.

Up to this point I have only discussed the theoretical and the laboratory application of this process. The installation of this method in a dyehouse would no doubt bring up the following questions:

1. Would the cost of dyeing be sufficiently reduced to warrant an expenditure for materials and equipment necessary?

2. Would not the gas escaping from the vat be dangerous to the health of the mill hands?

3. How about the danger of an explosion?

In answer to the first question, I will say that, owing to the fact that up to the present time this work has been limited to laboratory experiments, there has not been any work done in a practical way. Hence, I have not had any means of determining the actual cost of using hydrogen as an assistant reducing agent in the dyeing of vat colors.

Now, in regard to the danger that might be incurred by gas escaping from the liquor. The amount of gas flowing into the vat at one time would be very small, and an ordinary ventilating system would draw out any hydrogen that escaped from the machines.

In summing up I would like to say that this method of reduction has proved entirely satisfactory in all the work I have done in the laboratory. I have brought along dyeings of a few of our colors, in one case dyed the regular way and in the other dyed with the use of hydrogen gas as an assist to the hydrosulphite.

I am fairly convinced that this process of dyeing vat colors is entirely new. I have looked through old German books on the dyeing of vat colors as well as recent ones by American authors, but in no case did I find any mention of this process. I hope in the near future to be able to tell you more of my work on this process, and it is my belief that this method will solve some of the problems that come up in the dyeing of vat colors in open machines.

Mr. Warshaw—If any of you gentlemen can offer suggestions I would feel very much indebted to you. I will also try to answer any questions you may care to ask.

Mr. Jones—Have you tried the use of any catalyst other than the charcoal?

Mr. Warshaw—No; that is the only one I had a chance to try.

Mr. Jones—Nickel plate might do.

Chairman Killheffer—There are a great number of things that suggest themselves, of course, that can be tried, but Mr. Warshaw has just worked on this for a very short time. I have suggested a number of things to him, some of which you can't very well try out in the laboratory. For instance, I asked him to try to devise some method for ascertaining the consumption of hydrogen gas.

We know nothing about that so far; and that experiment which he made—making up two vats in one case in the regular way, and in another case with the hydrogen gas—was made with the idea of determining if there was any difference in the keeping qualities of the vat.

Then I asked him just before the meeting whether he had made experiments or had watched closely to see if there was any noticeable difference in the rapidity of oxidation, or anything that might indicate that there was a further reduction in the case of the gas than in the case of the hydrosulphite, and he said so far as he had gone he had not seen any difference in the speed of oxidation.

Mr. Jones—I should think that electrolytic reduction might be tried.

Dr. Matthews—Did you try that out in the alkaline vat? The use of activated nickel like they use in the hydrogenation of oil might be interesting. That is one of the strongest reducing agents there is, but there you have the addition of the hydrogen to the molecule.

The use of hydrogen was tried in the formation of indigo vats, but it has never been a success, I believe—that is, straight hydrogen gas.

Mr. Jones—I should think it would be necessary to have the hydrogen in a truly nascent state.

Dr. Matthews—But his hydrogen was not nascent.

Dr. Flynn—I can't help but believe that something of its effect might be accounted for by the fact that impure zinc was used in more or less hydrogen sulphate and incinerated hydrogen. I really cannot believe that pure hydrogen passed through an aqueous solution of caustic soda will serve any chemical action whatever, and I think it would be well to produce some of these tests under conditions in which we were absolutely certain the hydrogen was pure before we allow ourselves to believe that an action of this kind can take place, which really is contrary to all our experience.

Mr. Jones—You are almost certain to find arsenic there unless you use chemically pure zinc at the same time.

Dr. Matthews—I should think the use of some catalyzer would be essential there.

Dr. Flynn—I don't believe even catalyzers would work in the presence of water.

Chairman Killheffer—Are there any other comments? At our last meeting someone suggested that we might ask for questions to be sent to the Secretary—questions about anything that we might be mutually concerned in. The idea was that perhaps some of us have questions that we would like to have answered, but that, for one reason or another, we might not readily get to our feet in an open meeting and ask the questions. So the suggestion was made that the questions be sent unsigned to the Secretary, to be read at the meeting, and if there was anyone present who would like to make an attempt at answering them, all well and good; if not, it would give us something to work on. I think Mr. Grandage received a few and turned them over to you, Mr. Howes, didn't he? So we will ask you to read the first question and let us see what we can do with it.

Mr. Howes—These are the questions that were given to me by Mr. Grandage: "In the production of Mandarin Orange on silk by the use of nitric acid and neutralizing with soda ash, the silk loses its scroop, and an attempt to scroop with acetic acid or tartaric acid causes a great loss in depth of the color. How can this difficulty be overcome?"

Chairman Killheffer—I think we had better save that question until Mr. Carter is here.

Mr. Howes—The next question is: "Information in reference to obtaining the best method for bleaching and dyeing of manila straw with acid or basic colors to obtain the brightest possible shade."

Chairman Killheffer—Can anybody answer that? (No response.) Those are too easy; have you any hard ones? (Laughter.)

Dr. Matthews—"Manila straw" is rather indefinite there. We ought to know more about manila straw.

Chairman Killheffer—Is there any further discussion of any kind?

Before we adjourn I want to express my personal appreciation for the good turnout, and more particularly for the presence of some of the members with us to-night whom we haven't had the privilege of seeing here heretofore. And before we leave I would like to ask those of the Sectional Committee who are still here to remain for just a moment or so to consider a program for the next meeting.

. . . The meeting adjourned at 9.45 p. m.

JANUARY MEETING OF THE RHODE ISLAND SECTION

The January meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists was held in the rooms of the Providence Engineering Society, 44 Washington Street, Providence, R. I., Friday evening, January 11, 1924. The meeting was preceded by an informal dinner at the Rathskellar and was attended by some of the members.

The meeting was called to order at 8.15 by R. F. Culver, Chairman, and as the Secretary's reports have been published regularly by the AMERICAN DYESTUFF REPORTER the reading of these was omitted. As Mr. Verity, the Treasurer, was unable to be present, the Treasurer's report was read by the Chairman and was unanimously accepted by the Section.

The Chairman next called upon Edgar R. Ford, Chairman of the Nominating Committee (made up of Edgar R. Ford, Chairman; Albro N. Dana, Karl R. Moore and William Witte), to read the report of his committee, and the following nominations were announced: Ralph F. Culver, Chairman; Allison R. Fletcher, Secretary; Benjamin Verity, Treasurer. Sectional Committee: J. G. Masson, W. S. Williams, H. F. Schwarz and W. H. Wingate.

The Chairman then asked for other nominations from the floor, but, there being no other nominations made, Henry N. F. Schaeffer made the motion that the men referred to in the report of the Nominating Committee be elected. W. F. Deady seconded this motion and the vote was unanimously carried.

The Chairman then introduced J. F. Tonn, sales manager of the Oakley Chemical Company, who ad-

dressed the Section on the following subject: "Prepared Detergents for Textile Finishing." Mr. Tonn's address is published in full in this issue. A very interesting discussion followed Mr. Tonn's address, after which a rising vote of thanks was given him for his inspiring and instructive talk. The attendance was fifty. R. F. CULVER, Chairman.

PREPARED DETERGENTS FOR TEXTILE FINISHING*

By J. F. TONN

Sales Manager, Oakley Chemical Company, New York

The great volume of the detergents used in textile finishing plants consists of materials which may be classed as staple products. Alkalies particularly are sold under the manufacturers' specifications. When purchased in original packages or from reliable jobbers they can be relied upon to be as represented. Less exact specifications are used in the purchase of soaps, and in many plants the only basis for judging the quality of a soap is the results obtained from it. This is undoubtedly due to the difficulty of determining a suitable specification and ascertaining whether all deliveries meet that specication. The textile finishing plant which does not maintain a laboratory therefore finds it advisable to select such products of a reliable soap manufacturer as to meet its requirements by actual test. It can then be reasonably certain that subsequent deliveries will be similar in quality.

Textile finishing oils are relatively new to the industry; it is therefore necessary to rely on the manufacturer's guarantee as to their effective content.

In addition to these staple products a considerable quantity of compounds are used which are sold under the manufacturer's trade name without a declaration of their chemical content. These, for the lack of a better term, may be designated as prepared detergents.

The true test of any detergent is the results it gives, together with the cost of securing such results. Standard specifications enable a finishing plant to purchase in the open market staple materials which from experience are known to meet its requirements. They enable the purchaser to know that he is receiving the quality of goods he is paying for.

Whether the materials so purchased are the most suitable and the most economical to use or whether other materials would produce better results at the same cost is an entirely different matter. The average plant cannot conduct a conclusive investigation to determine this without going to some expense and taking a chance of interrupting production. When, due to some peculiar and often unknown change in conditions, or to undertake a new class of work, the materials at hand fail to produce satisfactory results, such an investigation becomes imperative. A material which would produce results is sought for and a material that will do this without increasing costs is welcomed. I believe it is safe to say that the greater part of the prepared detergents are consumed because of this fact.

To successfully market a prepared detergent—that is to establish a demand which leads to repeat business—requires first of all a product of merit. It will be judged by the results it produces and it will not continue in use unless it possesses advantages which make its use both desirable and economical. In addition to this it is, however, necessary for the manufacturer to know what his materials will accomplish and to understand the application of his materials. He must study the textile finisher's problems in order to apply his products to them intelligently. Briefly, the textile finisher's problem must be *his* problem.

This leads to the development of a sales organization which can also establish the correct and economical use of the products it sells. It places upon the seller the burden of proving the merits of his product. Co-operation between the textile finishing plant and the detergent manufacturer has been proved by actual experience to be mutually beneficial and profitable. The manufacturer of a prepared detergent can bring to bear on any particular problem the benefit of his experience on other similar problems and is frequently able to supply with his material a distinct service. Such service naturally will not be supplied with staple products purchased in the open market. Service can be supplied with a prepared detergent because it helps to create demand for a product which cannot be purchased on the open market.

A detergent manufacturer's trade-mark is his specification. The product must be uniform in quality or a loss in business built up at considerable effort will be experienced together with ultimate loss of prestige with the trade. Any deviation from a standard product would be business suicide.

Furthermore, in addition to maintaining an unvarying standard, the manufacturer of prepared products must continually seek for improvements in them. This is also accompanied by an effort to improve the finishing processes of the plants using the products. The result is certain to lead to progress in the manufacture and application of detergents. Too much cannot be said in favor of closer co-operation along these lines. Much improvement has been made in the past and possibility for greater improvement in the future exists. In spite of the development of very advanced theories on the action of detergents, no marked change in methods of application has taken place in the last fifty years. New detergents have

*Address delivered before the Rhode Island Section of the American Association of Textile Chemists and Colorists, January 11, 1924.

come forth in great numbers. Many of them of merit undoubtedly disappear from the field because the technique of using them is not established. A prepared detergent of merit backed up by an organization which understands the problem being undertaken can be of great value to the textile industry. The purchaser of such a material is purchasing the best results which it can be made to produce at minimum possible cost. When such results are better or costs are lower than can be obtained through the use of staple products, there is no question but that the textile finishing plant profits through using it continuously.

A few typical instances may serve to illustrate what can be accomplished along various textile finishing lines.

In kier boiling cotton goods it is frequently found necessary on the heavier weights to use two boils in order to obtain a well bottomed fabric. The practice of using two boils is a long established one—in fact the use of lime made the two boils necessary.

When caustic soda became abundant and low in price due to improved methods of manufacture, it became possible to boil many classes of goods successfully in one operation. A bleachery that uses a second boil on the heavier goods does so because practical experience has proved that it is necessary with the detergents at hand.

For a bleachery to go out in the open market and seek to buy a detergent which will produce satisfactory results in one boil would obviously result in the offering of numerous products for the purpose irrespective of what the manufacturers know of their application. Such a bleachery would shortly become an experimental station, and if it attempted to discover the right material by trying out the promising preparations submitted, it would seriously interfere with production.

When the representative of a firm of known standing goes into the bleachery, learns that the use of two boils is necessary for certain classes of goods and offers to prove that with the use of his product the same results can be obtained in one operation because he knows it is being done elsewhere, the average bleachery is sufficiently interested to give him a chance to prove his claims.

Actual demonstration that this is possible has reduced costs in a number of bleacheries. The cost of the detergents is of minor importance as the saving in fuel required for the second boil exceeds the total cost of detergents. The production of the kiers on the work in question is increased from 50 to 100 per cent, depending on whether or not the goods were formerly transferred to another kier before being boiled the second time. This increased earning power of the equipment at hand is certainly desirable when the bleachery is rushed.

In a mill manufacturing fiber silk knit goods the conditions under which the scouring of the fabric was done were such that the alkali used failed to produce results. Although the alkali was of specified quality, it had been adopted for the work without regard to its adaptability. The combined effect of free fatty acid present in the oil used for knitting and hardness of the water in use made it impossible to secure good results. Streaks and spots could not be avoided. Uniformity of the scoured fabric was uncertain. Here was a case where the textile finisher was seeking for improvement, because improvement was imperative. Advertisements of a detergent backed up by a guarantee and a service led him to inquire about the use of the material on fiber silk. Accumulated experience on the subject indicated that the above mentioned conditions were the cause of the trouble. By applying a material known to be suitable under such conditions perfect results were obtained. An absolutely uniform finish at all times at practically no increase of cost for detergents was a big step forward in the finishing process at this mill.

The preceding processes through which textile fibers and fabrics pass before reaching the finishing room frequently have a bearing on the wet finishing process, the importance of which is often not fully realized. A woolen mill which was having considerable trouble with crocking of dyes realized that imperfect scouring was the cause of the trouble. All efforts to thoroughly scour the fabrics did not entirely eliminate the difficulty. Investigation revealed the fact that raw wool scoured by several different firms was blended. Variations in the thoroughness with which the raw wool was scoured caused variations in the time required for scouring the piece goods. A standard procedure for piece scouring, therefore, could not be depended upon to give perfect results.

Improvement in the scouring of the raw wool was made. Attention was paid to the nature of the oil emulsion used before carding and spinning. Scouring of the piece goods then became an easier matter.

An outside point of view is often of considerable assistance in locating the cause for difficulties of this sort. When the cause of trouble has been identified, it is much easier to overcome the difficulty. The organization which makes it a practice to supply service with its products continually accumulates a wealth of information not only pertaining to the detergents but also the application of detergents. This information is available to textile finishing plants and can undoubtedly often be of real value to them.

As an example of how thoroughly trained salesmen representing up-to-date concerns manufacturing detergents prepare themselves for their particular work in connection with the textile industry, I am going to take the liberty of reading a paper written by one of them and read by him at a recent conference of such salesmen.

Prepared Detergents in the Textile Industry

The wet finishing operation in every branch of the textile industry offers a large and varied field for the use of prepared detergents. Methods of handling differ according to the nature of the materials and the kind of finish desired. Materials must be cleansed of all oils, grease and foreign matter before dyeing or bleaching, and the quality of the dyeing or bleaching depends on the thoroughness of the preliminary operation.

This paper will attempt to deal merely with the general procedure on different classes of materials. Raw cotton is boiled out in standard raw stock machines and then dyed or bleached in the same machine. A soft fiber is essential in this boil off, because the cotton is subsequently carded and spun. Unless the fiber is soft it will break in spinning. These machines are usually built to take seven hundred pounds of raw cotton. On stock to be dyed 1 per cent prepared detergent will give good results. Where the stock is to be bleached, it needs a better boil, for which the best formula is 1 per cent of prepared detergent and 1 to 1½ per cent of soda ash.

Cotton yarns (in the skein or warp) are boiled out either in open kiers or low pressure closed kiers. Two per cent. of caustic and one-half per cent of prepared detergent will give a good yarn boil. One and one-half per cent of caustic and 1 per cent of prepared detergent will probably give a little softer boil, but not, as a rule, any better white. Bleachers of knitting yarns are always more interested in a soft finish than are bleachers of weaving yarns. Cotton knit goods are usually boiled out under pressure, but otherwise the formulas given for yarns will give equally good results on knit goods.

Piece goods present a more difficult probelm. Closely woven goods are difficult for the solution to penetrate, and there is the additional problem of removing the sizing introduced before weaving. This sizing is on an acid fat base and tends to neutralize a percentage of the alkaline boil-off solution. Uniformly good results can be obtained in one boil with 2½ to 3½ per cent caustic and one-half per cent prepared detergent in a high pressure kier.

Many piece goods bleacheries use a two-boil process. One boil with prepared detergent and caustic shows a great economy in this case. In changing from the two-boil process it is advisable to put the goods through a brown sour in order to remove most of the sizing before going into the kier.

Artificial silk, being on a cellulose base, resembles cotton more than any other material. A large percentage of art silk goes into knitted fabrics and is heavily lubricated with neatsfoot oil. The main problem in finishing is to remove this oil. Frequently the fabric will be clean enough to take the dye evenly, but will have a strong odor after dyeing. Prepared detergent is very successful on this work and leaves the goods free of odor. Art silk is boiled off for from 1½ to 3 hours in a string tub machine. In this work it is important to know the volume of water in proportion to the weight of goods. On a general figure of 1¼ to 1½ gallons water to a pound of goods, 5 per cent prepared detergent will give very good results. Frequently art silk is knitted with a cross bar of stripes of real silk. Two per cent. prepared detergent and 5 to 8 per cent of soap will give good work.

In the dyeing of real silk a small amount of prepared detergent will give excellent results. One per cent of prepared detergent based on the weight of the goods is perfectly safe and usually the degumming can be done at a lower temperature. Hosiery silk, and tussah silk used for insulating wires, will stand 2 per cent or higher. I have had excellent results using prepared detergents where silk hosiery is degummed and dyed in the same operation. I have tried both 1 and 2 per cent of prepared detergents and both give good results depending on the condition. In this process, the prepared detergents, soap and dye are introduced at one time.

In the scouring of wool and woolen fabrics, prepared detergent is used in combination with soap. It gives excellent results on all classes of wool, but the use of excessive amounts of prepared detergent should be avoided, as it tends to thin the soap bead and lessens its carrying qualities. After working on this problem from every angle, I have found in every case that the only practical general method is to base the amount of prepared detergent on the quality of soap used.

On raw wool one pound of prepared detergent to six pounds of soap will show up well. On particularly greasy wools it is possible to use one pound of prepared detergent to four pounds of soap, but I would not advise making up a soap stock at this strength. On low grade wools for carpet yarns, use soda in combination with the stock. Prepared detergents and soap alone will give better results on high-grade wools for worsted yarns, etc.

Scouring wool yarn presents practically the same problem as scouring raw wool, but the yarns contain less grease so that a lower percentage of prepared detergents will give better work. One pound of prepared detergent to eight pounds of soap is a good average formula. On carpet yarns it is possible to use one pound of prepared detergent to six pounds of soap. Soda ash, in addition to the prepared detergent and soap, may be used on this class of yarns.

Piece goods are scoured with a high percentage of soap in a roller machine before dyeing. Prepared detergents give excellent results in this scouring, but here it is particularly important to keep down to the low percentage of prepared detergent, especially at the start. Every dyer judges his scouring in process by the soap bead

that he gets in the machine. Too much prepared detergents will cut down the bead. One pound of prepared detergent to twelve of soap is as strong as is safe at the start except in very hard water conditions.

Personally, I do not believe that a heavy bead is necessary for good scouring, and it is frequently possible to use with advantage a higher proportion of prepared detergent after it has been thoroughly established in the plant. It is well to keep the prepared detergents low at the start, though, because the man in charge of the machine, not seeing the customary bead, will add more soap, thus increasing the cost, all of which will be blamed on the prepared detergent.

When goods are scoured before fulling they are returned to the scouring machine after fulling, where the fulling soap is scoured out and the goods rinsed. Frequently no soap is added to this scouring, the fulling soap contained in the goods being sufficient. In the standard size machine, add 1½ pounds of prepared detergent in this first scouring after fulling. It materially aids the washing free of the fulling soap and breaks up any of the ordinarily insoluble soaps that are formed in the milling. I do not believe it advisable to use prepared detergents in the fulling soap except in cases of knitted goods that are scoured and fulled in one operation.

In conclusion, the following are the characteristics of a good prepared detergent:

(1) Non-injurious to the fiber.
(2) Effective for the removal of oils and fatty matter.
(3) An efficient water softener.
(4) A readily soluble material.
(5) A material effective at low concentrations.
(6) Free from material which will have an undesirable effect on subsequent operations if not properly removed.
(7) A free rinsing material.
(8) A material low in cost.

NEWLY ELECTED MEMBERS

At the meeting of the Council held in Boston, Saturday, March 1, 1924, the following applicants were elected to membership in the American Association of Textile Chemists and Colorists:

Active Members

Aeckerle, E. H., Garnerville Inn, Garnerville, N. Y. Research chemist, Rockland Finishing Company, West Haverstraw, N. Y.

Armour, G. L., 465 West End Avenue, New York, N. Y. Vice-president Siegle Corporation of America, 80 Fifth Avenue, New York, N. Y.

Barney, Harold C., 19 Paris Street, Pawtucket, R. I. Bleacher, U. S. Finishing Company, Providence, R. I.

Bashlow, H. I., 14 Fairfield Street, South Manchester, Conn. Colorist, Cheney Bros., South Manchester, Conn.

Boehringer, R., Hamilton Club, Paterson, N. J. Chemist, United Piece Dye Works, Lodi, N. J.

Booth, William R., 218 Myrtle Avenue, Boonton, N. J. Montville Finishing Company, Montville, N. J.

Brescia, Nicholas, 236 Sherman Avenue, Newark, N. J. Dye chemist, Marsden Sewell Corporation, Newark, N. J.

Clough, W. B., 122 Van Houten Avenue, Passaic, N. J. Textile chemist, Oriental Silk Printing Company, Haledon, N. J.

Dengler, C. E., 314 Pennington Avenue, Passaic, N. J. Chief chemist, United Piece Dye Works, Lodi, N.J.

Fiebiger, J. H., 1537 North Fifty-sixth Street, West Philadelphia, Pa. Chemist, H. A. Metz & Co., Philadelphia, Pa.

Franke, K. W., Roxboro, N. C. Chemist and dyer, Roxboro Cotton Mills, Roxboro, N. C.

Froelich, H. E., 639 McDonough Street, Brooklyn, N. Y. Chemist and color matcher, New Art Textile Print Works, New York, N. Y.

Griffin, Martin, Taunton, Mass. Chemist, Mount Hope Finishing Company, North Dighton, Mass.

Hales, W. W., 617 West 143rd Street, New York, N. Y. Demonstrator, Sandoz Chemical Works, New York, N. Y.

Hall, W. C., 371 Kerrigan Avenue, West Hoboken, N. J. Dyer, Hillside Dye Works, West Hoboken, N. J.

Ilg., N. V., 38 Maple Street, Providence, R. I. Assistant dyer, U. S. Finishing Company, Silver Spring Branch, Providence, R. I.

Kiviat, F., 388 Ellison Street, Paterson, N. J. Textile chemist, Strengs Piece Dyeing & Finishing Company, Paterson, N. J.

Leupold, H. F., 223 Maple Street, New Britain, Conn. Chemist, Cheney Bros., South Manchester, Conn.

Lotte, C. W., 581 Broadway, Paterson, N. J. Manager, National Silk Dyeing Company, Dundee Lake, N. J.

Marsden, W., 62 Railroad Avenue, North Andover, Mass. Dyer, Pacific Mills Print Works, Lawrence, Mass.

McKenzie, L. N., P. O. Box 352, Providence, R. I. Demonstrator, Edward C. Foster, Providence, R. I.

Mowry, S. J., Garnerville, N. Y. Chemist, Rockland Finishing Company, Garnerville, N. Y.

Murphy, J. R., Elkins Park, Pa. Dyer, American Dye Works, Inc., Tulip and Westmoreland Streets, Philadelphia, Pa.

Myers, W., Jr., 242 President Avenue, Providence, R. I. Superintendent, U. S. Finishing Company, Providence, R. I.

Peever, A., 404 Elm Street, Westfield, N. J. Dyer, American Felt Company, Rahway, N. J.

Pickrell, E. L., 11 Seymour Street, Montclair, N. J. Chemist, H. A. Metz & Co., New York, N. Y.

Riley, B., Jr., 78 Sterling Avenue, Providence, R. I. Chemist, John D. Lewis, Providence, R. I.

Rossi, Frank, 32 Edward Street, Providence, R. I. Assistant chemist, U. S. Finishing Company, Silver Spring Branch, Providence, R. I.

Ruff, Alban E., 45 East Fifty-fifth Street, New York, N. Y. Chemist, Ciba Company, New York, N. Y.

Tew, A. G., 2682 Hampshire Road, Cleveland, Ohio. Demonstrator, Dyes Distributing Corporation, Cincinnati, Ohio.

Junior Members

Alexander, S. Y., 84 Corbet Street, Dorchester, Mass. Assistant chemist, Sandoz Chemical Works, Boston, Mass.

Collins, Cornelius, 100 South Bend Street, Pawtucket, R. I. Floor foreman, U. S. Finishing Company, Pawtucket, R. I.

Day, Richard A., "The Bowlders," Saylesville, R. I. Apprentice, U. S. Finishing Company, Saylesville, R. I.

Dick, J. B., 305 Washington Street, Norwich, Conn. Chemist, U. S. Finishing Company, Norwich, Conn.

Endriss, P. A., 5645 Cedar Avenue, Philadelphia, Pa. Assistant dyer, Peerless Silk Dyeing Company, Philadelphia, Pa.

Glantz, Irving, 148 Amherst Street, Brooklyn, N. Y. Dyer, Novelty Braid Company, Brooklyn, N. Y.

Mazer, Samuel, 116 Harrishof Street, Roxbury, Mass. Student, Lowell Textile School, Lowell, Mass.

Mercer, G. C., Jr., 57 Prospect Avenue, Hackensack, N. J. Dyer, Millbank Bleachery, Lodi, N. J.

Mitchell, A. S., 23 Maple Street, Newburgh, N. Y. Student, Philadelphia Textile School, Philadelphia, Pa.

Nino, J. C., 131 North Twenty-first Street, Philadelphia, Pa. Student, Philadelphia Textile School, Philadelphia, Pa.

Stone, Albert, 65 Farragut Avenue, Providence, R. I. Chemist, U. S. Finishing Company, Providence, R. I.

Sturtevant, F. W., 60 Grove Street, Lowell, Mass. Student, Lowell Textile School, Lowell, Mass.

Walker, T. H., 58 Olive Street, Pawtucket, R. I. Chemist, Apponaug Company, Apponaug, R. I.

Wiegand, H., 1821 East Tioga Street, Philadelphia, Pa. Dyer, L. B. Luithlen Dye Works, Philadelphia, Pa.

APPLICANTS FOR MEMBERSHIP

The following is a list of names of those who are making application for membership in the Association:

Active Membership

Borrmann, Bernhard, colorist, Grasselli Chemical Company, New York, N. Y. Sponsors: E. H. Killheffer and C. F. Schaumann.

Clarenbach, Daniel L., dyestuff demonstrator, John Campbell & Co., New York, N. Y. Sponsors: George C. Lommel and Kenneth A. Brownell.

Drobile, Albert William, technical manager, Cynwyd, Pa. Sponsors: E. C. Bertolet and P. Theel.

Hannant, F. A., dyer, Parkhill Manufacturing Company, Fitchburg, Mass. Sponsors: R. S. Lunt and G. K. Hannah, Jr.

Muller, O. F., demonstrator and sales manager, 124 Pearl Street, Boston, Mass. Sponsors: H. Christison and L. A. Olney.

Pierce, A. H., supervisor application laboratory, Grasselli Chemical Company, New York, N. Y. Sponsors: E. H. Killheffer and G. Low.

Seibert, C. A., colorist, Grasselli Chemical Company, New York, N. Y. Sponsors: E. H. Killheffer and C. F. Schaumann.

Seltenwirth, L. L., chemist, Superior Dye Works, Long Island City, N. Y. Sponsors: J. Goldman and H. Grandage.

Sims, Clarence, dyer, Greenville Finishing Company, Greenville, R. I. Sponsors: R. F. Culver and W. E. Mitchell.

Junior Membership

Fitzgerald, J. P., assistant dyer, Philadelphia, Pa. Sponsors: P. Theel and E. C. Bertolet.

Luckman, H. O., assistant dyer, Ford Silk Hosiery Dyeing Company, Philadelphia, Pa. Sponsors: P. Theel and E. C. Bertolet.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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HARD FACTS, AND THE PROPOSED ANGLO-GERMAN DYE ALLIANCE

WHEN the dye manufacturers of England, led by British Dyes, Ltd., asked for protective legislation to save them from the machinations of the Kartel, there was much eloquence relative to patriotism, commercial independence, and "entirely British" industries. And the dye manufacturers of America, then passing through the rude buffeting attendant upon a similar struggle for protection, and with far less encouraging prospects of winning their fight for existence, applauded on this side of the water so vigorously that the cheers and handclapping might have echoed, one may almost imagine, in the very halls of Parliament itself.

Both English and American manufacturers were correct in their contentions that their industry was vital even beyond the admittedly important matter of immediate pounds sterling or dollars, these contentions being just as true to-day as they were then, and both groups in the end received a very fair measure of the special protection asked for.

And what has happened? We find the British Dyestuffs Corporation, which was the title assumed by British Dyes, Ltd., after its merger with Levinstein, Ltd., a corporation subsidized to the tune of 2,000,000 pounds by the British Board of Trade and regarded as the leading bulwark against future German chemical domination, actually entertaining proposals from the I. G. to join forces and share half the profits of the British market in return for dubious promises of technical assistance. We find this corporation, in other words, proposing to sell out to the one rival which was never again to enter the field.

This much is history, and well known to readers of The REPORTER. At the time of the drive for protection, there were many lofty ideals expressed and high-sounding phrases made use of—all very convincing at the time. But let that pass. The truth does not matter at all to some, and the spectacle of rats leaving a foundering ship, figuratively, occurs too often in everyday life to excite much comment. What causes more lively concern is the set of hard actualities which the consummation of such a bargain may be expected to produce.

It is known that the British dye industry has not done overwell. It has not done as well by far as the American industry, which has taken hold of many problems, both technical and engineering, and solved them to an extent which has placed them second in the world contest for variety and quantity of output.

But the British industry has not done so ill that it could not get along without a German alliance involving renewed commercial slavery for dye users and a complete collapse of the hope that England might never again find herself in a state of unpreparedness for modern military defense. It has not done so ill that the British public would not be willing to make further compromises with the B. D. C. directors in order to preserve for their nation the vital resources which the coal-tar chemical industry represents, and thus it is fairly obvious that these executives must have some reason for considering an alliance other than that they have forfeited the loyalty and support of their countrymen.

In the opinion of Professor Arthur G. Green, former Director of Research for the B. D. C., of whom we shall have more to say later, the seductive song of the German chemical Lorelei was first harkened to because of the agitation, by dye importers and users, for the repeal of the Dyestuffs Act; and the subsequent consent to enter upon negotiations, he thinks, partook of the nature of a running to cover in the face of an impending catastrophe. But if this were the case, what is the reason for all the secrecy, which more than anything else has aroused the British public to bitterness; and why were the smaller, independent dye manufacturers not included—which would be the logical manner of procedure?

Let us see what the general reaction to the proposed alliance has been. Up to a fortnight ago general opinion was not sufficiently crystallized to warrant any statement on this subject here. There was a feeling of extreme bitterness engendered by the secrecy surrounding the negotiations—a secrecy so absolute that the Board of Trade refused a deputation of outside manufacturers permission to see a draft of the proposals, even in strict confidence. Numerous indignation meetings had been held in Manchester, and the views of a number of small groups of makers, traders, users* and consumers were published from time to time—these views running all the way from approval to violent opposition and loathing. The firm of Singer & Brassard, for instance, issued a statement decrying the proposed merger and declaring that if it materialized the other manufacturers and merchants would have to go out of business. On the other hand, J. W.

*The British define "color-user" as a man who buys the dye to use in the product which he manufactures, and "consumer" as the man who buys the product; while a "trader" is generally an importer.

Buckle, a large user, characterized the combine as "very desirable, since our supplies will be better and we shall have a larger range of dyes." Speaking for the North British Chemical Company, Lionel Blundell condemned vigorously "the partisan spirit which would discredit British industry in its zeal against the B. D. C., and its thinly disguised zeal for the repeal of the Dyestuffs Act." Mr. Blundell also declared that "the loss to the nation, if the dyestuffs industry faded out, would be calamitous and irreparable," while A. E. Peck, of the Clayton Aniline Company, speaking in favor of an "all British" industry, rejected any move toward a monopoly. If given the rest of the ten years' protection provided by the Dyestuffs Act, he said, "we will face anything and provide all the chemists the country needs."

Thus it may be seen that opinion was at first very much divided, with a strong undercurrent of perplexity due to the fact that no one knew definitely just what terms were being considered and consequently could not reason logically.

But with the passing of the weeks, sentiment began to assume a more concrete form, and as the idea of what an alliance of any sort with the German coal-tar industry would mean to the British industry penetrated the national consciousness, that sentiment, encouragingly enough, lined up with the opposition, until at length we actually find even the Federation of Calico Printers passing the following resolution at a recent meeting at which hostility to the proposed combine was expressed:

"Resolved, That the Executives of the Federation of Calico Printers are strongly of the opinion that the draft agreement between the British Dye Corporation, Ltd., and the Interessen Gemeinschaft, as foreshadowed in the press, would, if carried into effect, be vitally detrimental to the interests of the calico-printing industry, and they call upon the Board of Trade to refuse consent to any agreement until colour-users of the country have been taken into full consideration in the matter."

Summarizing the situation as it exists at present, and taking into consideration the most recent indications, it may be said that the B. D. C. is to-day almost alone in its championship of the proposed combine, with the Board of Trade's attitude not well understood, due to persistent refusal to issue any statements upon this subject. Here and there are individuals and small firms who may favor a merger with the German interests, but the users, and the consumers in the main, as well as the traders, and, most important, the public, are now disposed to look upon such a move with sentiments ranging all the way from suspicion to downright opposition. There is a vast mass of published utterances, letters to the press, and oratory which might be quoted in substantiation of this conclusion, but space forbids. It is sufficient to know that the real meaning of the consequences of such a step is becoming better understood every day, and that the utter folly of selling future independence for a trifling immediate gain seems to be apparent to all but the B. D. C. executives, who give every indication that the project has not been abandoned. It is believed that their intention is to keep negotiations under cover until something can be done to allay the recently aroused public suspicion, and then to rush an agreement through with all possible speed.

One of the most interesting analyses of the outlook for the British industry if the merger is effected has been made by Prof. Arthur G. Green, who, as stated above, was formerly Director of Research to the B. D. C. Professor Green resigned his post last fall because, he declared, the corporation had not sufficient technical men to carry on the work—a statement of deep significance. He still retains enough of his former employers' viewpoint not to be wholly opposed to an arrangement with Germany for the regulation of markets and the "prevention of destructive competition," but he does consider that no agreement should receive government approval by which *de facto* control of British industries is placed in German hands.

There is a lesson for Britishers as well as for certain elements of the American dye industry in what Professor Green has to say.

Discussing the possibility of a combine from the standpoint of an outsider not "in the know" as to details, he declares: "If there is a clause—which seems not improbable—providing that the I. G. shall be the sole source of supply of intermediates used by the British but not manufactured by them, future development of the entire British chemical industry is threatened. Such enterprises as those for the manufacture of organic chlorine products, the production of coal-tar intermediates by the gas companies, and others, upon which much capital has been expended, would of necessity be jeopardized."

Basing his arguments solely upon such of the terms as have been disclosed, Professor Green thinks that "all technical organic research will be rendered superfluous." The B. D. C. will get knowledge "ready made," and the possibility of the profitable employment of inventions will be almost excluded; and he feels that the general public is scarcely likely to appreciate the great danger this will exert on all the manufacturing industries of the country. The B. C. D., he charges, has anticipated this result, since in its research staff it has already gone far "in the process of demolition." He points out that to-day a large proportion of the chemists occupying leading positions in Germany's chemical industries obtained their initial training in the dye industry, and "there is no doubt but that the great advance of German chemical science and chemical industry during the last half century was mainly due to the growth of her dyestuff industry and to the close interrelation between the latter and the universities."

Considering the effects of a combine, Professor Green states that the first of these would be that Britain would find herself without technical ability in her chemical industries. She would then find it cheaper to get her intermediates from Germany than to make them at home, as was the case before the war, and the subsequent step "in the downward path" would occur when it transpired that

even when using German intermediates, and with German technical assistance, the dyestuffs still could not be manufactured as cheaply in England as in Germany, "which the German partners of the B. D. C. would then offer to do."

Continuing in his prediction, Professor Green says: "Hence the inevitable result that the English company would become a distributing agency for German dyestuffs and other chemical products, whilst after a few years the manufacturing plant would fall into decay, and all technical knowledge and experience would be lost."

It is doubtful, thinks the writer, if the shareholders of the B. D. C. want to forego their profits in order to preserve the national character of the industry, and he believes that the corporation would be no longer interested in the retention of the Dyestuffs Act—"for its continued existence would hamper their operations, while its repeal would remove the last support of their competitors, the smaller independent manufacturers, who, subjected to the full blast of German and Anglo-German competition, would be quickly extinguished." The dye-users also, he believes, would likely not oppose a repeal, "and the resulting world-monopoly would be complete and *exert a strangle-hold upon our textile industries.*"

The italics are ours, and this view is the crux of the matter, for the textile industries of England and America are by far the heaviest users of dyestuffs and would be the very first to suffer in case control of either passed to foreign hands. The principal difficulty on the part of all elements of these industries is now, as in the past, to separate the wheat from the chaff in the matter of their own best interests; and while free competition among the dye makers of the world continues to wear a deceptively appealing aspect when immediate benefits are considered, this policy has time and again been proved to be disastrous to its temporary beneficiaries in the long run. Therefore, he who advocates such a thing puts himself, to all appearances at least, in the class of the fly-by-nighters.

Professor Green declares that as a "bait to dye users" it has been stated by those who are working for the combine that an alliance would equalize dye prices, thus assuring the British dyer or calico printer that he would not pay a higher price than his competitor abroad. "But," he continues, "is there any guarantee of this? The British consumer *will not* be a partner in any agreement between the B. D. C. and the I. G., and circumstances can readily occur whereby it would be advantageous to B. D. C. shareholders to quote higher prices"—and there, we may conclude, speaks a world of canniness and business experience.

Summarizing, Professor Green believes that, taking it by and large, the possible effects of an Anglo-German dye alliance based on the terms as disclosed thus far, "would be seriously prejudicial to the national interests."

That is the whole story. There is far more than one industry, one group, or one class to be considered. Because of the key nature of the dye industry, the effects of its presence or absence reach out into every corner of a nation, and they are effects of much weight and swift happening. Moreover, they are cumulative, and as a nation's coal-tar dye industry sinks lower and lower these effects pile up out of all apparent proportion to their first significance, until, in the event of a time of stress such as the Allies underwent from 1914 onwards for a number of years, disaster follows surely.

In view of all the foregoing, and in view of the greater success which has attended America's attempt to establish her own coal-tar chemical industry on a firm footing, is it not truly astonishing that talk of a possible German-American combine on similar lines should have been publicly current here? Nevertheless, this is so; there have been no open negotiations and no open proposal that negotiations be entered into, yet more than one factor concerned with the industry has predicted that such a thing would come to pass, and has stated that there were American manufacturers who desired that such a thing should come to pass.

It will be absurd to quibble about or even discuss such a possibility. It will be childish to encourage those who wish a merger or German connections, if such there be, by gossiping about the effects of a move of this nature.

The unpleasant actualities are sufficiently plain—too plain to permit of anyone being hoodwinked by those who profess to see advantages to America in German connections, even though there might be immediate and unstable advantages to individuals.

This country has no quarrel with the German people, as such. But neither we nor the British want foreign domination of a vital industry by a foreign power, a power which has shown itself in the past to be rapacious to a degree seldom equaled throughout recorded history.

And when that has been said, everything has been said.

TRIAL AND ERROR

WHEN Judge Hugh M. Morris, after months of persistent, exhaustive investigation and a very searching analysis of its results, arrived at his final decision in the Chemical Foundation suit, he is on record as declaring that not a single charge advanced by the Government could be sustained by the evidence submitted; not a single claim, not one accusation, was legally sound. Thus he dismissed the case from the United States District Court. Vindication of the Foundation was proclaimed by all—all save the Government and its counsel.

Immediately after the rendering of Judge Morris' decision the Government announced that an appeal to the United States Circuit Court of Appeals would follow shortly and that they felt certain of eventual success. That appeal has now been made, and on March 27, at Philadelphia, the entire case will again be dragged into court and the details combed over. It is difficult to understand exactly why the Government is so intent upon recovering the patents after it has been shown clearly and convincingly how necessary those patents are to the American dye industry and how necessary the American

dye industry is to America. As has been declared in a previous editorial, the only remaining incentive that can reasonably explain their stubborn attitude in the case is an excess of venomous political partisanship.

As evidence of Judge Morris' impartial desire for a final settlement, it is worth noting that he has prepared for use in the new trial a duplicate of all evidence used in making his decision. This doubtless necessitated considerable trouble on his part, but it will save incalculable time and useless legal formality for both plaintiff and defendant.

Although no new phases of the case are contained in this latest appeal, apparently the direction of attack has shifted. While it is probable that the same threadbare charges, based on legal technicalities and indefinite accusations, will form the hub of the arguments in the forthcoming litigation, they are now aimed, evidently, at the one individual who heretofore has been spared in the oftentimes violent barrage of denunciations showered at each other by the plaintiff and the defendant. That person is Judge Morris.

The Government asserts that he erred. Wilson erred, they said, in misplacing and misusing power. Polk erred; Garvan erred—in fact, one reviewing Government briefs receives the impression that every part of the dye patent transaction seems to be imprinted with a big red question-mark. Now, quite consistently, Judge Morris' entire decision is held to be one gross error. Just as *he* found that not one single charge contained in the Government briefs could be legally supported by evidence, so the Government asserts that not one single point in his decision is legally sound.

To err is human, but it is inconceivable that an intelligent, fair-minded magistrate like Judge Morris could have blundered to such an extent in his diligent quest for the actual facts. That the Government should disagree with his decision in no less than nineteen distinct points, and that it intends to contest each and every point, can result in nothing but a prolonged and bewildering series of legal and verbal battles.

T. C.'S COLUMN

TRADE PAPER AND TECHNICAL AUTHORITY

Trade papers, legal exponents, or whatever they choose to be called, are no doubt like most individuals, just bubbling over with an enthusiastic reception when a friend offers suggestions or criticism. So for the moment we shall try to act the part of the helpful friend, to see what we can see now in our AMERICAN DYESTUFF REPORTER and to suggest what we may hope to see in the future.

First and most notable are two interests that might be considered conflicting, the dye makers and the dye users, supporting the same journal. This spectacle is not unique, but when we consider the turmoil and arguments accompanying the development of the American dye industry, it does indicate a healthy state of co-operation for the good of all concerned, not forgetting the dear public. As for The REPORTER we have seen it grow from a strictly trade organ, we might almost say a propaganda sheet, to a commanding position as a technical authority. Credit is apparently due in many directions, to owner, editor, advertisers and contributors.

Such a publication serves many types of readers and a number of purposes. Most of us are probably well satisfied with its general make-up. The size is convenient. The pages are easy and pleasant to read. We like the advertisements kept separate from the reading matter; it makes the reading easier and facilitates binding if one desires it. We hope the argument that the advertising does not get enough attention when set off by itself will never prevail, and it certainly will not if advertisers exert themselves a little. There is no reason why the "ads" in a technical paper should not be even more attractive to its readers than those of the largest popular weekly, and not nearly as extravagant. There the advertising pages are read for pleasure by people who have not the slightest occasion to buy many of the things offered. Personally I do glance rather religiously through the advertisements in nearly every issue of The REPORTER, but many of these appeals could be made much more interesting.

I have thought that the name of the paper has begun to lose its significance, because it has been outgrown. But perhaps that is immaterial; we are little concerned about the names of old friends that we like.

Personal preferences have more to do with the popularity of a periodical than any rules. Every issue of The REPORTER is of permanent value. To make the parts that are of special interest more easily accessible, it is no doubt a common custom to enter the titles of selected articles in an index, with perhaps notes on their general contents. In this way one has an index before the publisher's index is issued, as well as a less bulky and in some respects a more useful one. To facilitate indexing, a minor improvement or two can be suggested. The first and more important is to put the volume and number on the pages of reading matter. At present the date is found on both the right and left hand pages, but one of these dates could be replaced and a glance would give the complete reference. Now the most convenient way is to turn back to the front cover to find the volume, often obscured by purple or other dark ink. It would also be a convenience to have the page number on the title page of each issue at the bottom. These are small details but the seconds and minutes saved here and there are the stuff of which hours are made.

The best can always be improved and some of the earlier "T. C." suggestions might be made to add to the technical excellence and interest. When nothing better is at hand we could promote a set of articles on how to correct poor work. Nor is this as foolish as it sounds. There are often difficult, if not insoluble, problems in

correcting stained goods and unlevel dyeings. There are equally important or more weighty ones in trying to change unsalable goods to something else. Black will not do for everything. For example, an ecru yarn containing Chloramine Yellow had to be changed to a bleached white.

There are volumes on how to put colors on, but mighty little on how to take them off, and just the things that go bad are just the ones that will not budge. Even a fugitive bluing for tinting whites may give trouble if a little too much gets on and the goods have to be made lighter. Much could be written on choosing colors with an eye to their removal.

Many of the things that ought to be on record cannot be found in existing books or other publications, and some of the finer points are perhaps not capable of literary expression at all. For a well rounded publication of the most permanent value, however, we need just these things; in other words more articles, but not too many more, with the smaller operating details like strength, time, and speed all included. These points cannot be adopted bodily for practical use, but are very important for the complete understanding of any process in textile chemistry. Details are the teeth on the tire that gear it to the road.

Nor can we overemphasize the need for articles that tell how things are actually done. Although not working on silk, I am interested in how it is weighted. I can read a lot about it but how is it actually done? Some sources give half a dozen methods, others schemes that are probably long out of date, while still other writers regale us with untried ideas and theories with little basis. Just what principles are used? And how is it done on the large scale?

Nor can we forget the theory. Theory and theoretical are frequently almost terms of reproach, but the words can be used in different senses and are often misused. Theories in the sense of mere speculations that things ought to work in certain ways are most often useless. Theories that are "philosophical explanations of phenomena" based on evidence are valuable, although they cannot necessarily be accepted as proved facts. Nothing is more important than understanding *why* things work, and good theories are in some cases the nearest that we can come to explanations. Where they are based on experimental data and common sense there is no greater aid to understanding and keeping out of troubles.

The need then is for a balanced ration, a little on "the state of the art," new methods anywhere in the field, laboratory work, practical mill work, and a reasonable amount of the right kind of theory. Strength in these technical matters with all the other present features makes the trade paper at the same time a technical authority.

T. C.

DYESTUFF TABLES

(*Continued from page* 154)

COMPETING PRODUCTS: Made in the United States by Central Specialty Company, De Brook Company, Heller & Merz, Hord Chemical Products Company, Textile Chemical Company.

STILBENE YELLOW

(Schultz No. 10)

COMPOSITION: Stilbene type; Mikado group.

SPECIALLY SUITABLE FOR: Cotton.

USUAL METHOD OF DYEING: In a bath of common salt at the boil.

SHADE: Brighter and greener than Direct Yellow R.

SHADE BY GASLIGHT: No change.

SOLUBILITY: Good.

LEVEL: Dyes level very easily.

EXHAUSTS: Very slowly.

FASTNESS TO:

Acid: Good to acetic acid only.
Alkali: Good.
Chlorine: Very good.
Fulling: Fair with neutral fulling.
Ironing: Good.
Light: Fair; changes shade after fourteen days' exposure.
Perspiration: Good fastness.
Rubbing: Excellent fastness.
Sulphur: Good fastness.
Washing: Poor; not fast.
Water: Poor; not fast.

MACHINE DYEING: Suitable.

DYED BY OTHER METHODS: Suitable for pad dyeing, but exhausts very slowly. Dyes cold. After-treatment with chrome and copper does not change the properties or the shade.

On Unions: Cotton-silk—leaves the silk white in a soap bath; cotton-wool—cotton is dyed more than wool even at the boil.

ON OTHER MATERIALS:

Paper: Very good; leaves back water clear; not so good for unsized paper; suitable for wall-paper paste colors.
Lakes: With barytes, barium chloride and alumina makes good lime colors.
Silk: Greenish yellow shade fast to washing and water; exhausts well. (Chloramine Orange No. 11 is faster to water on silk than this color.)
Oil Paints: Not suitable.
Lithograph Inks: Suitable; stands lacquering.

DISCHARGING: Color discharges white with zinc dust. Tin crystals give a brownish discharge.

COMPETING PRODUCTS: Made in the United States by E. I. du Pont de Nemours & Co.; Essex Aniline Company (Selling Agents, Grasselli Chemical Company).

(Additional colors will appear in future issues)

Foreign Dyes Imported Through the Port of New York During February

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce, in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS FOR FOREIGN MANUFACTURERS

1—The Six Leading German Companies

A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.

B—Badische Anilin-und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.

By—Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.

C—Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.

K—Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branches in Russia.

M—Farbwerke vorm. Meister Lucius & Bruning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2—The Seven Smaller German Companies

BK—Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.

GG—Chemikalienwerk Greishem G.m.b.H., Griesheim on the Main. Founded 1881.

CJ—Carl Jager G.m.b.H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.

GrE—Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.

L—Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.

tM—Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.

WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—Dutch, Belgian and French Companies

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.

NF—Niederlandische Farbe-und Chemikalienfabrik Delft, Netherlands (Delft). Founded 1897. Branch in Russia.

LG—Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)

P—Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4—Swiss Companies (all at Basel)

DH—Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.

G—Anilinfarben-und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany and Russia.

I—Gesellschaft fur chemische Industrie. Founded 1885. Branch in France.

S—Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5—English Companies

BAC—The British Alizarin Co., Ltd. Established 1882.

ClCo—The Clayton Aniline Co., Ltd., Clayton, near Manchester Founded 1876.

CR—Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.

CV—Colne Vale Chemical Co., Milnsbridge, near Huddersfield.

RHS—Read Holliday & Sons, Ltd., Huddersfield. Founded 1820. (Purchases by British Dyes, Ltd.)

BD—British Dyes, Ltd Founded 1915.

Lev—Levinstein, Ltd., Crumpsall Vale, near Manchester. Founded 1864.

Q—Importations of unknown source, through dealers in colors.

THE imports of coal-tar dyes for February, 1924, through the port of New York totaled 158,874 pounds, with invoice value of $176,657. In addition to the above, following imports of dyes were reported from other ports: Boston, 2,444 pounds, with an invoice value of $3,172; Chicago, 441 pounds, with an invoice value of $440; Philadelphia, 110 pounds, with an invoice value of $301.

The average monthly import of dyes, according to the preliminary figures, through the port of New York for the year 1923 was about 220,000 pounds. The average monthly import for coal-tar dyes in the United States during the year 1922 was 331,000 pounds.

Imports Through the Port of New York

Month	Pounds	Value
January	228,743	$232,571
February	158,874	176,657

Five Leading Dyes by Quantity Imported

January—	Pounds
Indanthrene Blue RS	15,090
Helindone Pink R	11,500
Indanthrene Golden Orange R	10,791
Ciba Bordeaux B	9,792
Chlorantine Fast Brown	8,488
February—	
Algol Brown B	20,497
Erioglaucine	12,213
Indanthrene Gold Orange R	6,960
Algol Brown G	6,679
Phosphine	6,522

Relative Imports by Countries of Shipment

	1924	
	January	February
Germany	41%	44%
Switzerland	32%	35%
Italy	6%	8%
Belgium	8%	4%
England	5%	3%
Canada	3%	1%
France	3%	2%
All others	2%	3%

The imports of color lakes during the month of February totaled 4,181 pounds, with an invoice value of $1,848. No imports of color lakes were reported for the previous month.

The dyes in this report are grouped by Schultz numbers, and in the case of those which could not be identified by Schultz number the classification according

to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

The designation of "†" for competitive and "*" for non-competitive indicates the appraisement basis for the assessment of the ad valorem duty in Paragraph 28 of the Tariff Act of 1922. Those dyes without designation are doubtful, pending further investigation.

The ad valorem rate for competitive dyes is based on the American selling price as defined in Subdivision (f) of Section 402 of Title IV; the ad valorem rate for non-competitive dyes is based on the United States value as defined in Subdivision (d) of Section 402 of Title IV of the Tariff Act of 1922.

(The following table includes imports through the port of New York to the amount of 158,874 pounds, and also 2,444 pounds from Boston, 441 pounds from Chicago and 110 pounds from Philadelphia.)

Schultz No.	Name of Dye and Manufacturer	Quantity (pounds)
19	Fast Light Yellow	500
	Fast Light Yellow 3G—(By)	
28	Hansa Yellow G	360
	*Hansa Yellow G Pdr.—(M)	
74	Tannin Orange R	30
	Tannin Orange R Pdr.—(C)	
88	Acid Anthracene Brown	441
	*Acid Anthracene Brown PG—(By)	
118	Geranine	248
	Brilliant Geranine B—(By)	
120	Salmon Red	10
	Salmon Red—(A)	
158	Chrome Brown	551
	*Chrome Brown RVV—(G)	
274	Diaminogene B	499
	*Diazo Indigo Blue 2RL—(By)	
319	Diamine Scarlet	500
	Diamine Scarlet 3B—(C)	
449	Trisulphon Brown	3,307
	*Trisulphon Brown B Conc.—(S)	
456	Benzo Fast Blue	220
	*Benzo Light Blue 4GL—(By)	
457	Trisulphon Brown GG	5,236
	*Trisulphon Brown GG Conc.—(S)	
506	Erioglaucine	12,213
	*Erioglaucine AP—(G)	
	Erioglaucine EP—(G)	
507	Xylene Blue VS	2,094
	†Xylene Blue VS Conc.—(S)	
508	Xylene Blue AS	500
	*Xylene Blue AE Conc.—(S)	
523	Fast Green	5,069
	*Fast Green Extra Bluish—(By)	
545	Patent Blue A	110
	*Brilliant Acid Blue FF—(By)	
546	Cyanol	220
	Cyanol FF—(C)	
554	Chrome Azurol	551
	*Chrome Azurol S Conc.—(G)	
562	Fast Acid Blue	1
	Brilliant Wool Blue B Extra—(By)	
565	Acid Blue B	200
	Wool Blue 5B—(A)	
571	Rhodamine 6G	224
	*Rhodamine 6G Extra—(B)	
572	Rhodamine G	25
	Rosazeine G Extra—(M)	
597	Rose Bengal	10
	Rose Bengal B—(M)	
606	Phosphine	6,522
	†Patent Phosphine G—(I)	
	Patent Phosphine M—(I)	
	†Patent Phosphine R—(I)	
	Phosphine O—(Q)	
609	Homophosphine	2,240
	*Corioflavine RROOOO Pdr.	
613	Quinoline Yellow	55
	†Quinoline Yellow Conc.—(G)	
627	Anthracyanine	661
	*Chromacetine Blue S—(DH)	
663	New Methylene Blue	200
	New Methylene Blue NS Conc.—(S)	
673	Azo Carmine B	500
	Rose Induline 2B—(K)	
681	New Fast Gray	1,102
	*Malta Gray J—(P)	
687	Rosolane CTR	625
	Methylene Heliotrope Extra—(M)	
705	Indamine 6R	200
	Indocyanine B—(A)	
720	Sulphur Black	10
	Sulphur Black AWL Extra—(A)	
746	Katgene Green	2,205
	*Pyrogene Green GK—(I)	
759	Anthraflavone G (single strength)	1,759
	*Anthra Yellow GC Paste—(B)	
	Anthra Yellow GC Pdr.—(B)	
	*Anthraflavone GC Paste—(B)	
760	Indan. Golden Orange G (sgle. stngth.)	1,793
	*Indan. Golden Orange G Dbl. Pst.	
	Helindone Gldn. Orange IG Pst.—(M)	
	Helindone Golden Orange IG Dbl. Pst. —(M)	
	Helindone Gldn. Orange IG Pdr.—(M)	
761	Indan. Gldn. Orange R (sgle. stngth.)	6,960
	*Indan. Golden Orange RRT Pst.—(B)	
	Helindone Golden Orange IRRT Pst. —(M)	
	*Vat Orange RRT Pst.—(B)	
765	Indan. Green B (sgle. stngth.)	794
	†Indan. Black BB Dbl. Pst.—(B)	

Schultz No.	Name of Dye and Manufacturer	Quantity (pounds)
778	Alizarine Synthetic Alizarine Red DIB New Pst.—(M)	3,800
780	*Alizarine Red S Alizarine Red S Pdr.—(B)	1,014
810	Helindone Yellow 3GN (sgle. stngth.) Helindone Yellow 3GN Pst.—(M)	220
819	Algol Red FF, R (sgle. stngth) *Vat Red FF Extra Pst.—(By) *Vat Red FF Extra Pdr.—(By)	2,176
820	Algol Brilliant Violet R (sgle. stngth.) Algol Brilliant Violet R Pdr.—(By) Vat Brilliant Violet RK Pst.—(By) Vat Brilliant Violet RK Pdr.—(By)	3,732
821	Algol Brilliant Violet BB (sgle. stngth.) Vat Brilliant Violet BBK Pst.—(By)	1,001
822	Algol Brilliant Orange FR (sgle. stngth.) *Algol Brilliant Orange FR Pdr.—(By) Vat Brilliant Orange FR Pst.—(By)	660
823	Indan. Bordeaux B (sgle. stngth.) *Indan. Bordeaux B Pdr.—(B)	1,320
831	Indan. Red BN (sgle. stngth.) Indan. Red BN Extra Pst.—(B) Helindone Red IBN Extra Pst.—(M) Helindone Red DIBN Extra Pst.—(M) Vat Red BN Extra Pdr.—(B)	3,024
832	Indan. Violet RN (sgle. stngth.) *Vat Violet BN Pst.—(B)	419
833	Algol Olive R (sgle. stngth.) *Algol Olive R Pst.—(By) Vat Olive R Pst.—(By) Vat Olive R Pdr.—(B) Vat Olive R Pdr.—(By)	5,613
834	Algol Gray (sgle. stngth.) Vat Gray GK Pdr.—(By)	88
847	Algol Green B (sgle. stngth.) Vat Green BB Pst.—(By)	701
849	Indan. Yellow (sgle. stngth.) Indan. Yellow G Dble. Pst.—(P)	110
852	Alizarine Irisol D, R Alizarine Blue JR—(By)	110
853	Anthraquinone Violet *Anthraquinone Violet Pdr.—(B)	448
855	Alizarine Pure Blue B *Alizarine Sky Blue B Pdr.—(By)	760
856	Alizarine Astrol Alizarine Blue AS Pdr.—(By)	1,001
858	Alizarine Saphirol B †Alizarine Light Blue B Conc.—(S)	2,205
864	Anthraquinone Green .*Anthraquinone Green GXNO—(B)	44
865	Alizarine Direct Green G †Alizarine Cyanine Green G Ex.—(By)	165
869	Algol Brown B (sgle. stngth.) Algol Brown R Pst.—(By) Vat Brown R Pst.—(By) *Vat Brown R Pdr.—(By)	20,497
870	Algol Corinth R (sgle. stngth.) Helindone Corinth IRK Pdr.—(M) *Vat Corinth RK Pst.—(By)	1,401
893	Alizarine Indigo G Alizarine Indigo G Pst.—(By)	1
894	Alizarine Indigo B Alizarine Indigo Green B Pst.—(By) Alizarine Indigo Violet R Pst.—(By)	2
895	Alizarine Indigo 3R *Alizarine Indigo 3R Pst.—(By)	501
896	Helindone Blue 3GN Helindone Blue 3R Pst.—(M)	175
904	Helindone Brown G (sgle. stngth.) Thioindigo Brown G Pdr.—(K)	275
907	Ciba Scarlet (sgle. stngth.) *Ciba Scarlet G Extra Pst.—(I) Thioindigo Scarlet 2G Pst.—(K)	3,968
908	Ciba Red R *Ciba Red R Pst.—(I)	2,645
910	Helindone Pink Helindone Pink AN Pst.—(M)	1,521
912	Thioindigo Red B (sgle. stngth.) *Ciba Pink BG Pst.—(I) *Ciba Pink BG Pdr.—(I)	1,299
917	Helindone Red B (sgle. stngth.) Helindone Red B Pst.—(M)	148
918	Helindone Red 3B Helindone Red 3B Pst.—(M) *Thioindigo Red 3B Pst.—(K)	4,023
919	Ciba Bordeaux B (sgle. stngth.) *Ciba Bordeaux B Pdr.—(I)	3,310
920	Helindone Violet Helindone Violet R Pst.—(M)	500
923	Ursol Fur Blue Black SB—(A) Fur Brown NZ, P, 2R, 4R—(A) Fur Yellow 2G—(A) Nako DR—(M)	1,525

UNIDENTIFIED DYES

Acid Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Alizarine Rubinol *Alizarine Rubinol 3G—(By)	786
*Fast Light Red BL—(By)	220
*Guinea Fast Red BL—(A)	1,500
*Polar Red 3B Conc.—(G)	551

Vat Dyes

Algol Brilliant Pink (sgle. stngth.) *Algol Brilliant Pink FB Pdr.—(By) *Algol Brilliant Pink FF Pst.—(By)	591
Algol Brown G Vat Brown G Pst.—(By)	6,679
Alizarine Indigo 7G, 5R, 7B Pst.—(By)	3

Name of Dye and Manufacturer	Quantity (pounds)
Alizarine Indigo Brown R Pst.—(By)	1
Alizarine Indigo Green G Pst.—(By)	1
Alizarine Indigo Gray B Pst.—(By)	1
Alizarine Indigo Red R Pst.—(By)	1
Alizarine Indigo Pink B Pst.—(By)	1
*Ciba Printing Black G Pst.—(I)	881
Hydron Orange RF Pst.—(C)	331
Hydron Scarlet 2B (sgle. stngth.)—(C)	330
Indan. Pink B (sgle. stngth.)—(B)	2,018
Indan. Red Violet RRN, RRK Pst.—(B)	401
Mordant and Chrome Dyes	
*Alliance Fast Brown 5G Pst.—(BD)	50
*Brilliant Chrome Blue R Pdr.—(By)	331
*Chromal Blue GC for Printing—(G)	1,103
Chrome Yellow CR—(G)	551
†Eriochrome Flavine A Conc.—(G)	2,205
Metachrome Blue Black 2BX—(A)	500
Metachrome Olive Brown G—(Bro.)	1,000
*Ultra Corinth B—(S)	100
Direct Dyes	
Benzo Light Brown 3GL—(By)	55
*Brilliant Benzo Violet B, 2R—(By)	963
*Chloramine Light Violet R Conc.—(S)	330
*Chlorantine Fast Brown RL—(I)	2,535
*Chlorazol Fast Orange 9188K—(BD)	50
Diamine Fast Bordeaux 6BS—(C)	55
Diamine Fast Brown GB—(C)	110
Diamine Fast Orange EG—(C)	524
Diazo Brilliant Orange 5G Extra—(By)	10
Diazo Light Violet BL—(By)	95
*Diazo Indigo Blue 4GL Extra—(By)	366
Direct Brown—(PP)	22
Fast Cotton Yellow RL, 4GL—(A)	10
*Parasulfon Brown V—(S)	500
*Rosanthrene Orange R—(I)	441
Zambesi Black D—(A)	500
Sulphur Dyes	
†Cross Dye Green 2G Conc.—(BD)	2,344
†Cutch Brown 2R Conc.—(S)	500
*Pyrogene Violet Brown X—(I)	661
Sulphur Brilliant Blue CLB—(A)	500
Basic Dyes	
*Indoine A Extra Pure—(G)	110
*Rhodamine Sky Blue 3G—(By)	110
Spirit Soluble and Color Lake Dyes	
Helio Bordeaux BL Pst.—(By)	500
*Helio Bordeaux BL Pdr.—(By)	992
*Paper Fast Bordeaux B—(By)	11
Permanent Red F6R Extra—(A)	5
*Typophor Yellow FR—(B)	100

Name of Dye and Manufacturer	Quantity (pounds)
Unclassified Dyes	
Blue I—(BC)	13
Blue II—(BC)	13
Blue III—(BC)	3
Blue V—(BC)	3
Diazo Solamine I—(BC)	13
Diazo Solamine II—(BC)	13
Diazo Solamine III—(BC)	13
Golden Orange I—(BC)	13
Golden Yellow VIII—(BC)	13
Orange I—(BC)	13
Orseille Red—(PP)	7
Pure Yellow I—(BC)	13
Red I—(BC)	13
Red III—(BC)	13
Red V—(BC)	13
Royel Blue—(PP)	7
Taupe Gray (Mole)—(PP)	4
Turquoise Blue—(PP)	7
Color Lakes of Coal-Tar Origin	
*Azure Blue	2,560
Brown Madder Lake D	20

ALIZARINE RUBINOLE R

Under the above designation, the Grasselli Chemical Company is placing on the market its domestic manufacture of this well-known color. The properties and the chemical composition of both the imported and domestic products are the same.

Alizarine Rubinole R is dyed with an addition of Glauber salt and sulphuric acid, and is very level dyeing. The color is fast to acid, alkali, stoving, steaming and washing, and its fastness to milling will suffice in most cases. Its extraordinarily good fastness to light, which is superior to that of any other color of similar shade, makes it a very valuable product, and it is not only particularly well adapted for self-shades but is a very useful product in combination with such colors as Alizarine Blue SAP, AS, JR, SKY, the Alizarine Cyanine Greens and the Fast Light Yellows for the dyeing of an extensive range of shades on ladies' dress goods, gentlemen's suitings, as well as carpet yarns. White cotton effect threads are not stained.

Another advantage of this color is that it can be dyed on a chrome mordant or after-chrome and its shade is only slightly affected as compared with the acid dyeing.

It is also well adapted for dyeing silk and Gloria silk (silk and wool), both fibers being dyed a uniform shade. As a shading color in half-wool dyeing the wool is dyed a deep shade in a neutral bath containing Glauber salt.

It is also well adapted for wool printing and especially for pink shades very fast to light and washing, as well as for shading purposes, but it is of no particular value for color discharge.

Technical Notes from Foreign Sources

Moisture in Artificial Silk

A very interesting article has appeared in the German textile magazine Textilberichte, No. 1, 1924, describing the results obtained in an investigation on the moisture-absorbing capacity of different kinds of artificial silk. It is mentioned in the article that the purpose of the investigation was to establish whether or not this determination could be of some assistance in differentiating between various grades and makes of the artificial, which, as the textile man knows, is frequently a very difficult matter. In other words, the moisture-absorbing property of artificial silk is to be used, if practical, in conjunction with chemical and microscopic determinations in the analysis of unknown artificial silks.

The apparatus used was a box or chamber with glass walls, in which was placed a sensitive balance and a rack for hanging the samples of silk which was equipped with a mechanical device, operated from the outside of the box, for moving the samples of silk from the rack to the balance and back again. An arrangement was also provided for blowing moist or dry air into the box so that the average humidity of the air was maintained constantly during the tests at 65 per cent. The samples were subjected to the action of the air and weighed, then dried at a temperature of 100 to 110 deg. Cent. and again subjected to exposure to the moist air. This treatment was repeated a number of times, the samples being weighed after exposure for a definite length of time.

The results of the investigation are tabulated and show clearly that the nitro-cellulose variety of artificial silk, Chardonnet silk, has a much greater moisture-absorbing power than either viscose silk or cupra-ammonium silk, glanzstoff. The conclusion is reached that the determination of the moisture-absorbing capacity affords valuable aid in differentiating Chardonnet silk from viscose silk and cupra-ammonium silk.

Artificial Silk from Rubber

Yarns or threads consisting essentially of rubber are produced by extruding through fine jets rubber solutions, rubber latex or masticated rubber, with simultaneous or subsequent vulcanization by any of the known methods. The rubber may be mixed with guttapercha, balata, "rubber substitute" or coloring matters. The jets of latex or solution can be solidified in warm air or in a bath of suitable precipitant, the rubber then passing through a bath of soap and water or of shellac in alcohol to correct adhesiveness. The process is patented in British Patent No. 205,532.

Textile Dyeing Process

The simultaneous dyeing of several layers of fabric wound on a cylinder or plaited down in laps or of yarn wound on a cop is effected by squirting a dye liquor through the fabric or yarn at various points. The fabric or yarn may thus be partially dyed in one or more shades. The apparatus for squirting the dye liquor comprises a dye liquor reservoir and a pointed injector, the pressure employed being high, so that the injection is rapid and undesirable spreading of the liquor by capillary attraction is avoided. (British Patent No. 205,057.)

Printing White Discharge on Fast Steam Green

Cotton fabric is padded with a liquor containing 50 grams per liter of Fast Steam Green, 50 grams of iron pyrolignite of 10 deg. Be. (specific gravity 1.075), 50 grams of acetic acid of 6 deg. Be. (specific gravity 1.045) and 10 grams of sodium bisulphite of 38 deg. Be. (specific gravity 1.360). The fabric is then dried, steamed for ten minutes and then printed with a discharge paste containing 200 grams of Rongalite C per liter, 150 grams of sodium citrate and 500 grams of gum water, then steamed for from five to ten minutes and afterward washed. It is reported that the resulting shade is solid and fast to light and washing; but the process, though satisfactory, may be shortened by omitting the first operation of steaming and extending the second to not less than ten minutes. (Bull. Soc. Ind. Mulhouse, Vol. 99, pp. 529-30.)

Influence of Oxalic Acid on Formation of Aniline Black

The rate of formation of Aniline Black by oxidation of a solution of aniline hydrochloride with sodium bichlorate is accelerated about forty times by the addition of a small amount of oxalic acid. The accelerating influence of oxalic acid can be applied to the printing of cotton and silk fabrics with Aniline Black. The cotton is impregnated with a mixture of solutions of 10 grams of aniline hydrochloride in 50 c.c. of water and 2 grams of ammonium oxalate in 50 c.c. of water, respectively. The material is then air-dried and printed with a paste obtained by dissolving 20 to 30 grams of gum arabic in 50 c.c. of hot water, cooling and adding 15 grams of sodium bichromate and 3 c.c. of concentrated hydrochloric acid. (Helvetia Chim. Acta., Vol. 6, pp. 1029 to 1032.)

FRANKLIN PROCESS DISPLAY AT BETTER FABRICS EXHIBIT, PROVIDENCE, FEBRUARY 18 TO 23

One of the most attractive displays at the Better Fabrics Exhibit conducted by the Better Business Bureau of Providence during the week of February 18 was that shown by the Franklin Process Company, of Providence, R. I., Philadelphia, Pa., and Greenville, S. C. In fact, this particular display was pronounced by one of the committee to be the "queen of the exhibit."

In line with the purpose of the exhibit, the Franklin Process Company displayed only fabrics containing fast-to-bleaching (and therefore fast-to-laundering) colors. Practically all the fabrics were shown both before and after washing in a commercial laundry, some of them having been laundered as many as eighteen times. This method was used to demonstrate that laundries do not injure the color in fabrics, provided the manufacturer uses the proper type of color in the beginning, the proper colors in this particular case being vat dyes applied by the Franklin Process. As most manufacturers already know, the Franklin Process dyes yarn in the wound form in a highly concentrated bath under pressure. In this way unusual penetration of the yarn is obtained, resulting in exceptionally solid, even and brilliant shades.

All of the fabrics shown were labeled with the brand names and with the names of the manufacturers and sales agents so that the public could tell what to ask for should they wish to purchase fabrics containing Franklin colors in local retail stores. This scheme also made it easy for department store buyers, who visited the exhibit in considerable numbers, to refer to the proper sources in case they wished to stock any of the brands shown in the Franklin Process display.

Complete co-operation was established between the Franklin Process Company and the department stores during the exhibit, so that the Franklin Process Company was enabled to refer interested spectators to the various department stores in Providence that carried any of the branded fabrics shown.

The branded fabrics containing Franklin Process fast colors which were shown in the exhibit were as follows: Peter Pan Ginghams, manufactured and marketed by Henry Glass & Co., New York; Chauvelisse Tissues, marketed by Fred Butterfield & Co., New York; Burton Tissues, marketed by Burton Bros.

& Co., New York; Blackstone & Berkeley Shirtings, marketed by Taylor, Clapp & Beall, New York; Hobart Shirtings, marketed by Van Dam & Barnard, New York; Artistic Shirts, marketed by F. Jacobson & Son, New York; Louisville Plisse Beach and Bathrobe Fabric, marketed by Westerly Textile Company, New York; Stevens Bedspreads, marketed by Clarence Whitman & Son, New York; Rosemary Damasks, marketed by Joseph L. Wilson & Co., New York; Candlewick Bedspreads, loaned by the Shepard Company department store of Providence and manufactured in the South; Redcrest Towels, marketed by James Elliot & Co., Inc., and Androscoggin Towels, manufactured by Androscoggin Mills at Lewiston, Me.

THE KNITTING ARTS EXHIBITION

With nearly the total amount of spaces sold and the number of exhibitors far in excess of previous years, the Twentieth Annual Knitting Arts Exhibition to be held at Philadelphia under the auspices of the National Association of Hosiery and Underwear Manufacturers on April 7 to 11 at the Commercial Museum promises to be far the most successful ever held in the history of the trade.

Chester I. Campbell, who will direct and personally guide the big exposition, is highly enthusiastic over the interest being shown throughout the industry.

"The Knitting Arts Exhibition has become the annual get-together of the hosiery and underwear trade," states Mr. Campbell. "Its scope is not only limited to the manufacture of finished goods, but it also provides the allied trades an opportunity to display their lines direct to the buyer."

As to the exhibition itself, every conceivable kind of machinery and appliance for the manufacturing, dyeing, bleaching, finishing and drying of knit goods will be shown.

THE 1924 PAPER SHOW

The Paper Industries Exposition at the Grand Central Palace the week of April 7 promises to be one of unusual interest both to technical men and to the general public. It is stated that every paper company which exhibited last year will be represented at this the second exhibition. Plans are under way for a special program by the Technical Association of the Pulp and Paper Industry, which is to hold its annual convention during Paper Week. The value of the exposition as a means of working with the paper mill executives is not being overlooked by the big chemical companies, which have learned from experience that the exposition method is a most satisfactory one for the demonstration of chemical products.

American dyes in the second and third quarters of last year constituted about 7 per cent of the imports of such products into India. In 1922 the percentage was about 3.2.

The Executive Committee of the American Chemical Society, which has a membership of nearly 15,000, has voted to support the Mellon tax-reduction plan, it is announced by the treasurer of the Society, Dr. John E. Teeple, of New York. The Society acted in response to a communication from Owen Johnson, secretary of the Authors' League of America, urging that the chemists join other groups in forming the Federation of American Professional Societies to seek relief in behalf of the country's professional workers.

Good news, pointing to increased activity in the dyestuff and textile chemical markets, is contained in the report that the discouraging slow period among the New England textile mills is about to end. The Fall River mills and the Durfee and Troy mills are working on close to normal schedule. The Stafford and Union mills are expected to resume production in a week or less. It is probable that this general "waking up" will have a beneficial influence on the dyestuff trade, tending to start in motion again part of those stocks which have accumulated during the winter season.

Burdette J. Beardsley, well known among advertising men, has been elected vice-president of the Hazard Advertising Corporation, which numbers several dye and chemical firms among its accounts. Mr. Beardsley was long associated with Montgomery Ward & Co. and Sears, Roebuck & Co., and his experiences with these nationally famous establishments well equipped him to create and organize the Charles Williams Stores, Inc. Consequently, after twenty years of such broad experience he will doubtless prove a most valuable addition to the Hazard corporation.

E. R. Bridgwater has joined the sales staff of the Du Pont Company, in the dyestuffs division. He was formerly connected with the Firestone and Goodrich companies, and will work in the development of the rubber accelerator field.

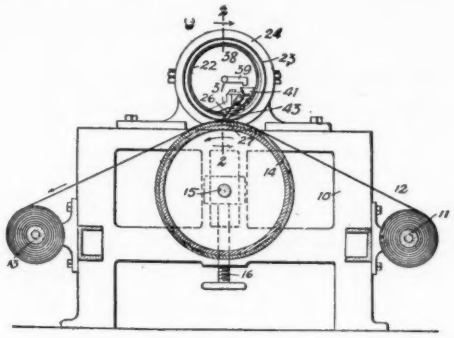
Dr. Oscar Brock, formerly of Badische Anilin und Soda Fabrik, Oppau and Merseburg, Germany, is now in charge of the factories of P. Soldati & Co., Buenos Aires and Rosario, Argentina, manufacturers of medicinal and fine chemicals.

RECENT PATENTS

Fabric-Printing Machine

(1,480,348)

Ernest Cadgene, Englewood Cliffs, and George Dupont, Paterson, N. J.

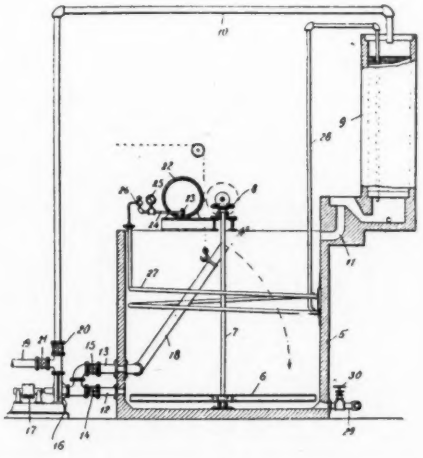


In a fabric-printing machine, a stationary support, a stencil freely mounted for rotation thereabout, means exerting a pressure against said stencil for rotating the same, and other means exerting a pressure against said stencil in opposition to the first-named pressure for insuring a uniform rotation of said stencil about said stationary support, and for evenly distributing a composition to a fabric to be printed which is passed between said stencil and the first-named means.

Preparation of Liquid-Bleach Solutions

(1,481,106; January 15, 1924)

James H. McMahon, Niagara Falls, N. Y., assignor to the Mathieson Alkali Works, Inc.., New York, N. Y., a corporation of Virginia.

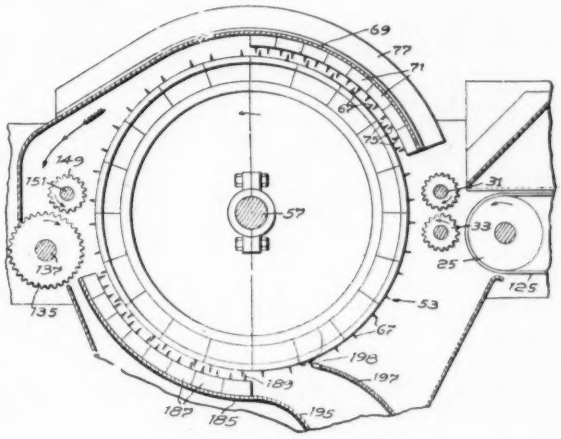


The method of preparing bleach solutions by subjecting an alkaline solution to the action of chlorine, which comprises vaporizing liquid chlorine by heat exchange relation with a body of the alkaline solution and causing the gaseous chlorine to contact with another body in which a large surface of the solution is exposed to the gas.

Machine for Fluffing Fibers

(1,483,049; February 5, 1924)

Thomas J. Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Company, Boston, Mass., a corporation of Massachusetts.

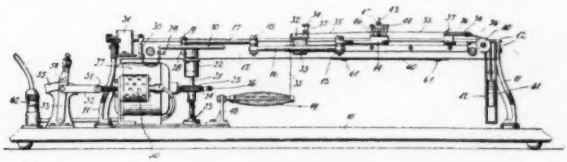


A machine for fluffing fibers comprising, in combination, a cylinder having pins on the periphery thereof, means to feed a mass of fibers to the cylinder, members having pins projecting toward the cylinder, said members being spaced circumferentially of the cylinder, a pair of rolls adjacent the cylinder and intermediate said members for feeding fibers to the cylinder, and means to rotate said cylinder, thereby to cause its pins to sweep past said feeding means, members and rolls, thereby to pick the fibers from the feeding means and rolls and fluff up the fibers.

Apparatus and Method of Testing Silk Threads

(1,482,231; January 29, 1924)

Albert August Hasler, Hazleton, Pa., assignor to Duplan Silk Corporation, New York, N. Y., a corporation of Delaware.



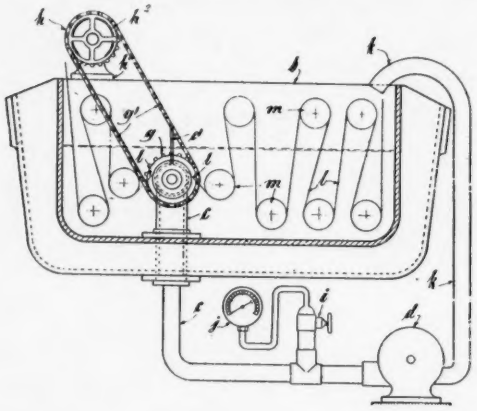
The method of testing a silk thread which consists in placing the thread under a predetermined tension and subjecting opposite sides of the thread while under tension to a reciprocating scraping action.

Apparatus for Impregnating Fabrics with a Mercerizing or Other Liquid

(1,483,060; February 5, 1924)

Ernest Farrell, Salford, Manchester, England.

Apparatus for enabling fabrics to be impregnated with a mercerizing or other liquor comprising a vat, a series of guide rollers in said vat, a long pipe in said vat extending horizontally to points near two opposite



sides and having a long narrow slot, the fabric to be impregnated passing around said guide rollers and over said slot in passing through the vat, a branch outlet pipe and an outlet opening in the vat with which the branch pipe communicates, guides in the long pipe, guide plates carried by said guides and extending upward through the slot and well above the pipe, a spindle with right and left hand screw threads for adjusting the guides and guide plates relatively to each other, and a pump for continuously extracting liquor from the long pipe through the branch pipe and returning it to the vat, substantially as herein set forth.

Method of Making Water-Softening Material

(1,482,601; February 5, 1924)

Svein Dahl-Rode, Brooklyn, N. Y.

The method of making a water-softening compound which consists in mixing iron furnace slag in powdered form with caustic soda, then adding water and boiling the mixture to the consistency of a thick paste, then drying out the mixture and treating the same with a boiling solution of sodium silicate.

FEDERAL TRADE COMMISSION REPORT

The Federal Trade Commission recently sent a report to the President giving in detail figures and facts covering the administration of the Trading-with-the-Enemy Act. That part of the account treating of the licensing of German trade-marks and dye patents affirms what is now so well known—that the present magnitude of the American dye and chemical industries is due mainly to the war-time acts of the commission and other Government departments.

The report is worth the consideration of men in the dye industry in that it probably gives specific figures regarding the transactions referred to; these figures serve primarily to establish definite bounds by which it is possible to measure the results and effects of dye patent licensing. Heretofore much given out as fact was unsubstantiated speculation.

The commission received as royalties 5 per cent of the gross sales under each license—a sum amounting to over a million dollars for the ninety-odd licenses issued. As an interesting example of foresight on the Government's part it is worth noting that these royalties now form a reserve fund with which to meet the demands growing out of numerous suits started by the original patent owners after the close of the war.

The Easton Silk Dyeing & Finishing Company, located at Franklin and Peach Streets, Easton, Pa., has sold its interests to the Valley Dye Works, Inc., a new concern, which has taken over the local plant. The personnel of the company includes: President, Henry Dietz, Paterson, N. J.; vice-president, C. H. Seiters, New York City; secretary-treasurer, W. R. Plunkett, Philadelphia; mill superintendent, E. T. Fisher, Philadelphia. Following improvements and renovation, the plant will be operated at capacity with thirty to thirty-five workers.

LABORATORY CHEMIST

Young man with eight years' experience in dyestuff laboratory work seeks new position. Graduate of Pratt Institute. Thoroughly competent to take charge of sample testing and matching, and all routine laboratory work. Address Box 247, American Dyestuff Reporter.

WANTED

Dyestuff Laboratory Supervisor. Must be familiar with application of dyes on textiles. Excellent opportunity for right man. Give full particulars regarding previous experience, etc. Box 248, American Dyestuff Reporter.

FOR SALE

Small lots of Algol Yellow, Indanthrene Blue and Algol Red. Closing out. No reasonable offer refused. Address Box 249, American Dyestuff Reporter.

BRILLIANT ACID BLUE 3B

An original wool dyestuff

Most—if not all—of the dyestuffs produced in the United States are duplications of products which have already been introduced.

Now we have the pleasure of announcing the introduction of an entirely new dyestuff possessing many desirable qualities.

BRILLIANT ACID BLUE 3B is an acid wool dyestuff of great strength. It produces brilliant blue shades of satisfactory fastness to washing and wearing and does not crock. It dyes level and can be used in combination with other acid dyestuffs.

Wool dyers will recognize the advantages of using Brilliant Acid Blue 3B, for it places at their disposal a color producing great brilliancy and strength at a reasonable price.

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